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ABSTRACT

Papers presented at this conference focus primarily on the development of critical thinking and problem solving skills. Topics related to critical thinking include metacognition, curriculum development, and teaching strategies in foreign languages; teaching critical reading of literature to develop critical thinking skills; use of guided design in the humanities to teach thinking and assessment skills; facilitating various learning styles; creative thinking, personality theory, and Christian theology; an interdisciplinary faculty course on critical thinking; and integrating skills and content to master reasoning skills. Papers focusing on problem solving discuss algorithms and computers; the scientific method and mathematics; a guide for nurses dealing with racial issues is also included. Papers discussing individualized instruction include a description of an instructional center designed to deliver college courses across the disciplines; and discussions of the contract as an individual approach to facilitate student learning and strategies for the culturally diverse learner. Other topics addressed include use of the feedback lecture method for nontraditional students; enriching students' experience in the visual arts; a case study of a computer-assisted learning unit in biology; maximizing students' writing across the curriculum; a motivational approach to student learning; and graphic methods of sequential planning and hierarchical ordering to promote reasoning skills. Access to individual papers is provided by a copy of the conference program. (DJR)

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ISII 1986 PROGRAM

Thinking Across The Disciplines

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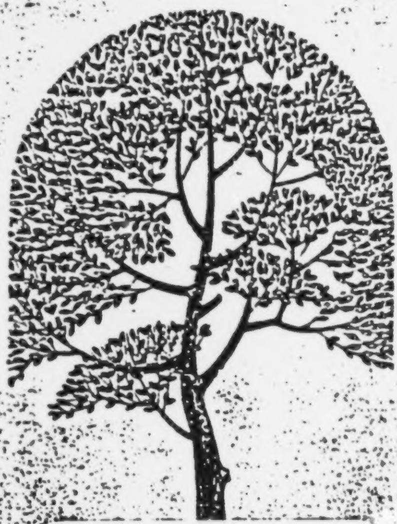

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PROGRAM

Thursday, October 9th

7-10 pm Hospitality Room - Cash bar – RENAISSANCE I

WORKSHOP SESSION I

7:30 OVERVIEW PRESENTATIONS – WISTERIA/CAMELLIA

A. AUDIO-TUTORIAL/INDIVIDUALIZED INSTRUCTION USING COMPUTERS - J.E.J. Habowsky and Robert A. Stager, University of Windsor, Canada

Audio-Tutorial Instruction is a proven strategy that individualizes and improves the learning process. Computers add two dimensions: (1) Computers allow students to search for and discover patterns in subject matter material; (2) Computers provide a focus for the work of a team as they apply concepts to the solution of real problems.

B. INTEGRATING AND ASSESSING CRITICAL THINKING IN AN OUTCOME-FOCUSED, ASSESSMENT-BASED COLLEGE CURRICULUM - C. Blaine Carpenter, Faye T. Barr and James C. Doig, Clayton State College, GA

In this session the development of a model for teaching and assessing critical thinking the general education curriculum, using the interrelationships between critical thinking and two knowledge-based frames of reference - contemporary perspective and value perspective - as examples, will be examined. Participants will have an opportunity to examine and use potential assessment instruments.

C. THE FEEDBACK LECTURE: WORKING WITH STUDENTS - Dean Osterman, Oregon State University

This workshop demonstrates the use of the Feedback Lecture for working with students in higher education. Students are unique with various learning styles and needs. The lecture is traditional in colleges and universities. To blend these entities (students and the lecture approach) together in one classroom and expect efficiency and effectiveness is challenging. The Feedback Lecture is reaching students with a teaching and learning approach acceptable to both parties.

D. TEACHING THINKING SKILLS WITH GUIDED DESIGN - Charles E. Wales, Anne H. Nardi, West Virginia University

Subject matter knowledge and thinking skills come together in the process that defines a human being, the process of decision-making. GUIDED DESIGN is a teaching/learning strategy that allows educators to model and teach the spectrum of abilities involved.

8:00-9:30 DETAILED PRESENTATIONS

Friday, October 10th

Hospitality -- UNIVERSITY OF GEORGIA ROOM (8:00-5:00)

8:20 am WELCOME Donald Borchardt, Rutgers, the State University - Newark, President ISII -- RENAISSANCE IV

The Paper sessions which follow consist of two parts. In the OVERVIEW PRESENTATIONS each of six speakers will present a 5-minute summary of his or her paper to all participants. In the DETAILED PRESENTATIONS each speaker will move to a separate room for a 20-minute presentation on the work plus 5 minutes for questions and answers.

PAPER SESSION A

Session Chair: Jean E. Wold, California State University, Chico

8:30-9:00 OVERVIEW PRESENTATIONS -- RENAISSANCE IV

1. "Decision-Making by Individuals and Groups Solving Problems in the Eighties," Dean L. Meinke, The University of Toledo

   More than three hundred and fifty subjects were run in more than seventy groups which varied from three members to as many as seven members in the group. All subjects solved the NASA problem as individuals and in groups. Group solutions were better than individual solutions. Results will be discussed as a function of the size of the group and the respective quality of solutions.

2. "An Interdisciplinary Creativity Program," Art Skibbe and Ed Turner, Appalachian State University

   Our "paper" will be a multimedia (videotape, slide, music) description of an interdisciplinary creativity program which has been in existence at Appalachian State University (Boone, North Carolina) for 10 years. We will describe a team-taught creativity course which is designed to enhance intellectual and artistic creativity in undergraduate students. The presentation will include an example of at least one "looking at things differently" exercise.

3. "Problem-Solving and Decision-Making in a Mastery-Based, Individualized Laboratory," William J. Mullin and John Tidswell, University of New Brunswick, Canada

   A mastery-based individualized laboratory is an ideal opportunity for students to develop decision-making and problem-solving skills. This paper describes a laboratory course for up to 150 second year undergraduates which is based on this philosophy and approach.

4. "Guided Design: Sensitivity to Black-White Interactions When Giving Nursing Care," Theresa M. Fernandez, Medical College of Virginia, Virginia Commonwealth University

   This Guided Design is one outcome of a University grant to develop expertise in faculty in dealing with racial issues. It has been used in undergraduate nursing courses and guides students through structured problem solving steps concerning a white student, black client problem simulation. Evaluations of the tool are included and next steps considered.

5. "Theatre People as Problem Solvers," Julia Curtis, University of Nebraska at Omaha

   By rooting an introductory course to the arts in Shakespeare's Romeo and Juliet, an instructor may promote critical thinking by showing how the text and its staging is the result of "seeing" the problems, selecting a solution, and evaluating the effects.

6. "Does Cognitive Improvement Promote Ethical Development?", George Williams, Burlington County College, NJ

Research by Harvard psychologist William G. Perry suggests a surprising answer to this question. How does other research corroborate his theory? What are some of the implications regarding our role as educators in a variety of disciplines?

9:10-9:35 DETAILED PRESENTATIONS

1. WISTERIA
2. CAMELLIA
3. MIMOSA
4. LAUREL
5. DOGWOOD
6. GARDENIA

PAPER SESSION B

Session Chair: Ken Klopfenstein, Colorado State University

9:50-10:20 OVERVIEW PRESENTATIONS – RENAISSANCE IV

1. "The Center For Individualized Instruction: An Alternative to the College Classroom," Leah N. Knowlton, Middlesex Community College, Massachusetts ✓

   This paper examines the development, organization and administration of a community college instructional center designed exclusively for the delivery of college courses, across the disciplines, using the technology of individualized instruction.

2. ✓ "Metacognition and Higher Order Thinking: An Interdisciplinary Approach to Critical Thinking in the Humanities," Elena M. DeCosta, University of Wisconsin-Stevens Point ✓

   This paper explores critical thinking as well as curriculum development and teaching strategies. The centrality of the arts of Socratic questioning, accurately reconstructing opposing points of view and engaging in constructive intellectual exchanges in an interdisciplinary setting will be discussed and illustrated. Special focus is Foreign Language curriculum.

3. "Course Management Strategies For The Individualized Laboratory," John Tidswell and William Mullin, University of New Brunswick, Canada

   Individualized undergraduate laboratories can encourage critical planning and decision-making by students, but are demanding on resources and staff time. This presentation offers course management strategies for addressing these concerns, particularly in large laboratory situations.

4. "Motivating Faculty to Pursue Teaching Excellence," Dean N. Osterman, Oregon State University

   This paper describes a program at Oregon State University that has been in existence for the last 14 years. It promotes excellence in teaching and professional enhancement. The presenter will discuss workshops and seminars offered at Oregon State that work together to motivate faculty.

5. "The Contract - An Individualized Approach to Competency-Based Learning and Evaluation," Patricia G. Beare, University of Texas Medical Branch ✓

   Using contracts as a teaching strategy, the focus of learning is on how students and faculty can jointly participate in designing instruction to facilitate student learning. Principles of adult learning are utilized strategically as the student becomes an active participant in the learning process.

6. "Teaching Critical Reading to Develop Critical Thinking," William M. Taylor, Oakton Community College, IL ✓

   Teaching critical reading of current literature in the discipline is a tangible way to help students develop critical thinking skills while introducing them to the salient issues of the discipline, its intellectual conventions, and its norms for determining truth. And it need not take up much class time!

10:30-10:55 DETAILED PRESENTATIONS

1. WISTERIA
2. CAMELLIA
3. MIMOSA
4. LAUREL
5. DOGWOOD
6. GARDENIA

6

PAPER SESSION C

Session Chair: Charles Wales, West Virginia University

11:10-11:40 OVERVIEW PRESENTATIONS-RENAISSANCE IV

1. "Alpha Learning: A Non-traditional Approach to Learning," Diann Schindler, Olympic College, WA

   The Alpha Learning program uses mental techniques in conjunction with study skills to enhance the teaching-learning process. This presentation will explain Alpha Learning, its theoretical underpinnings, and its integration into the college curriculum.

2. "Design Team Approach to the Creation of Interactive Video," John C. Ittelson, California State University, Chico

   This session will describe the elements of an interactive video delivery system and the role of the design team in creating interactive video courseware.

3. "The Decline and Fall of Integrated Chemistry - Physics at UWGB," Jack Norman, University of Wisconsin

   At its inception in 1969, UWGB offered integrated Chemistry-Physics as the only introductory courses in either chemistry or physics for science majors, pre-engineering and pre-professional students. The evolution over a decade and the eventual demise of this program are presented.

✓ 4. "Guided Design as a Think Tank Strategy for Teaching Course Content," Donald A. Borchardt, Rutgers, The State University of New Jersey - Newark

   The purpose of this paper is to demonstrate how course content can be adapted to include thinking skills. A unit of study is used as the basis for examining how subject matter can be structured with learning objectives, study guide, a hypothetical problem situation, instructions and feedbacks. The "Guided Design" example under consideration is particularly suited to courses in the humanities.

✓ 5. "From Family Trees to Decision Trees," Helen R. Trobian, Bennett College, NC ✓

This paper will illustrate types of hierarchical ordering, value assessment, and decision making graphic aids as devices for encouragement of sequential reasoning and quantitative literacy in various fields.

6. "Multiple Text as a Method of Teaching Critical Thinking and Writing Skills," Louis A. Foleno, City University of N.Y. - College at Staten Island

Multiple texts are used to teach thinking/writing skills and to enhance motivation. Based upon interests and assignments, students compare topical coverage. The lessons are oral and written, focusing upon which book is better and why.

11:50-12:15 DETAILED PRESENTATIONS

1. WISTERIA
2. CAMELLIA
3. MIMOSA
4. LAUREL
5. DOGWOOD
6. GARDENIA

12:30-1:45 LUNCH – RENAISSANCE III
WELCOME, Harry Downs, President, Clayton State College

PAPER SESSION D

Session Chair: Gene Lucas, Drake University, Iowa

2:00-2:30 OVERVIEW PRESENTATIONS – RENAISSANCE IV

1. "Thinking Skills: Making a Choice," Charles E. Wales, Anne H. Nardi, Robert A. Stager, West Virginia University

A body of knowledge defines a curriculum. Thinking skills define an educated person. But which skills should be taught and how should they be presented? Although Bloom's Taxonomy does not fully define the way thinking skills are actually used, it does provide a basis for the selection.

✓ 2. "Facilitating Critical Thinking in Clinical Practice," Deanna Persaud, Carol Leedom, Linda Land, California State University, Chico ✓

To facilitate individuals with various learning styles, activities which promote the transfer of theoretical knowledge into clinical practice have been developed. Innovative applications of critical incidents, feedback lectures, case studies and computer assisted interactive video instruction in a baccalaureate nursing program will be explored.

3. "On Some Possible Links Between Personality Theory, Cultural Levels of Adaption, and Christian Theology," Ralph G. O'Sullivan, Illinois Central College

   The purpose of this paper is to link several sets of ideas in personality theory to each other and Christian theology, and then it links several sets of ideas in personality theory and Cultural Anthropology to each other and to Christian theology. The linking provides students with creative interdisciplinary thinking opportunities.

4. "The Effectiveness of Self-Paced Learning Supplemented by Computer Aided Instruction in a Physical Science Course for Non-Science Majors," John Wernegreen, Eastern Kentucky University

   This study examines the hypothesis of an inverse relationship between prior achievement and level of instructional support. Comparisons were made between lecture students and self-pace students.

5. "Teaching Peer Tutors to Foster Thinking Skills," Kenneth Klopfenstein, Colorado State University

   Peer tutors are an important resource for students in Colorado State's self-paced, mastery oriented instructional system in mathematics. Tutors learn to help students become autonomous, self-sufficient thinkers in the credit seminar described in this presentation.

2:40-3:05 DETAILED PRESENTATIONS

1. WISTERIA
2. CAMELLIA
3. MIMOSA
4. LAUREL
5. DOGWOOD

WORKSHOP SESSION II

Session Chair: Jean E. Wold, California State University, Chico

3:15-3:30 OVERVIEW PRESENTATIONS – RENAISSANCE IV

A. A COURSE IN THINKING FOR INTERDISCIPLINARY FACULTY GROUPS, Rachel M. Lauer, Thinking and Learning Center, Pace University, NY

Participants will experience, first hand, a typical class for faculty wishing to learn how to incorporate critical thinking into their own discipline. Concepts, techniques and evaluations of faculty will be presented and discussed.

B. THE GUIDED DESIGN GUIDEBOOK: Patterns in Implementation, Gregory P. White and William C. Coscarelli, Southern Illinois University

Twenty six patterns that encompass the planning, implementation, and survival of a Guided Design course will be presented. The patterns are summarized in the Guided Design Guidebook, (a practitioner's manual for developing Guided Design systems), which will be used as the basis of the presentation.

C. NETWORKING PERSONAL COMPUTERS IN THE CLASSROOM, Ronald A. Goodman, Quincy Junior College, MA

This presentation will deal with the advantages, costs and materials involved in networking personal computers in the classroom. There will be discussion and demonstration of hardware and software involved in the process.

3:30-5:00 DETAILED PRESENTATIONS

A. MIMOSA
B. GARDENIA
C. WISTERIA

Saturday, October 11th

Hospitality – UNIVERSITY OF GEORGIA ROOM (8:00-5:00)

PAPER SESSION E

Session Chair: Christine M. Campbell, Purdue University

8:30-9:00 OVERVIEW PRESENTATIONS – RENAISSANCE IV

1. "Enhancing College Student Achievement Through Metacomprehension Training," James D. Long and Patricia Gaynor, Appalachian State University, Elizabeth W. Long, Watauga County Schools, NC

   Many college students express surprise upon learning that they have performed poorly on a course exam. Such students say that they have studied and thought they understood the material. Often the problem of these students lies within the domain of metacomprehension. This presentation is oriented toward improving college students' comprehension monitoring skills through the use of minimal intervention strategies with wide application.

2. "Research or Practice: The Debate Goes On," Charles E. Wales, Anne H. Nardi, and Robert A. Stager, West Virginia University

   Is research somehow superior to practice? Are the thinking skills involved in the researcher's process of inquiry more sophisticated than those the practitioner applies to problem-solving? Should educators emphasize the skills associated with research or should practice be given equal time?

3. ✓ "Problem Solving With Generic Algorithms and Computers," E. Jay Larson, Lewis Clark State College, ID ✓

   An algorithm designed around the data processing concepts of input, processing and output can provide a basis for classifying problems. This organization then allows persons and/or computers to solve many seemingly very diverse problems.

4. ✓ "Feedback Lecture Method: Working With Non-Traditional Adult Students," Cal R. Williams, Multnomah County Extension, Oregon State University ✓

   The Feedback Lecture Method, in which specific guidelines are followed, has proven to be an effective tool for working with non-traditional adult students in a county extension home economics program. This paper describes the Feedback Lecture Method, including the specific guidelines.

5. "The Resource - Curricular Innovations," Linda K. Gunzburger, Loyola University of Chicago, Medical Center

   The mission of the Learning Resource Center is to provide resources needed to facilitate learning in the medical sciences for students and faculty. Materials are provided through a variety of strategies designed to enhance medical learning of the basic and clinical core curriculum.

9:10-9:35 DETAILED PRESENTATIONS

1. WISTERIA
2. CAMELLIA
3. MIMOSA
4. DOGWOOD
5. GARDENIA

PAPER SESSION F

Session Chair: Donald A. Borchardt, Rutgers, The State University, Newark, NJ

9:50-10:20 OVERVIEW PRESENTATIONS – RENAISSANCE IV

1. "California Math Project and Guided Design in Grades K-8," Duane Clow, Colorado State University, Eunice Krinsky, CSU, Dominguez Hills, CA.

   This paper will discuss the California Math Project and how Guided Design will be incorporated into the classroom in grades K-8. We will discuss the attitudes of the teachers about Guided Design and give examples of projects written for these grades.

2. "Experiments in Learning: Electronic Writing Instruction," Guy Burneko, Emory University, GA

   It is the living example of the teacher, alone and in sustained discussion, actually working out a problem, that introduces learners most immediately to the problems and promise of creative thinking and effective writing. The methods of TV and film production allow us to replicate and highlight aspects of this engagement.

3. "Educational Goals and Teaching Practices," Christine J. Bendell, Washburn University of Topeka, KA

   This paper includes a clarification of educational goals and teaching practices in the arts from the viewpoint of a musician-pedagogue. One aspect of achieving the most effective response to music instruction is through group interaction. Within the dynamic group interaction is the dynamic of leadership, so important to the reciprocal system of rewards between group and leader.

4. "Teaching Decision-Making with Guided Design and Microcomputers," Robert E. Stager, J.E.J. Habowsky, and R.F. Lewis, University of Windsor, Canada

   A unique method of teaching decision-making has been developed by combining the Guided Design method with the microcomputer. Projects are presented on the printed page; group responses are made to a word processor.

5. "Use of Guided Design in Teaching Educational Assessment Skills," Daniel W. Stuempfig, California State University, Chico

   Guided design was used to teach assessment skills to education students. Students responded favorably to the method and displayed greater achievement than students taught by traditional lecture/discussion. Use of deliberate decision making strategies was not clearly revealed.

6. "The Arts, Aesthetics, and Education," Marilyn L. Munski, University of Wisconsin, Madison

   Quite often the arts are taught independently of one another. However, creators of art do not think only in terms of an individual art form. Although Kandinsky, Van Gogh, and Picasso are considered painters, all three were influenced by other art forms. The disciplines of literature, music, drama, and dance have had a profound impact on their works of art.

10:30-10:55 DETAILED PRESENTATIONS

1. WISTERIA
2. CAMELLIA
3. MIMOSA
4. LAUREL
5. DOGWOOD
6. GARDENIA

PAPER SESSION G

Session Chair: Dean Osterman, Oregon State University

11:10-11:40 OVERVIEW PRESENTATIONS-RENAISSANCE IV

1. "Highlighting the Scientific Method Through Mathematics Problems," William McGalliard, Appalachian State University, NC ✓

   The scientific method involves a cluster of problem solving strategies. The environment of problems in mathematics is an excellent site for stressing those strategies. Theoretical foundations, example problems, and student reactions to the modeling of the scientific method with mathematics problems will be discussed.

2. "Observations on Intellectual Developmental Levels and Student Performance in an Individualized A-T Histology Course," Gene A. Lucas, Drake University, Iowa

   Students in a normal histology course were given Piaget-type evaluations, then provided with various individualized modifications of classroom experience with tissue technique and tissues and organs. As a result more students achieved a higher degree of success.

3. "A Case Study of a Computer Assisted Learning Unit: The Growth Curve of Microorganisms," Jehuda Huppert, School of Education of the Kibbutz Movement - Israel, Reuven Lazarowitz, Technion-Israel Institute of Technology ✓

   A computer assisted learning unit, "The Growth Curve of Microorganisms," was developed and implemented. This unit enables students to investigate, through computer simulations of experiments, the impact of three variables: temperature, nutrient concentrations and initial cell number, upon the growth curve of a population. This unique combination of biological process, math equation and computer simulation may help students improve their cognitive skills.

4. "Guided Design Applied to Foreign Language Study: A Controlled Experiment," Christine M. Campbell, Purdue University, IN

The presentation will discuss the genesis, method, and results of the first statistically - controlled experiment in which Guided Design was applied to foreign language study, specifically, a third semester Spanish grammar and culture course at Purdue University. Student achievement in reading in Spanish, writing in Spanish, and evaluative capacity will be examined.

5. "A Non-Traditional Approach for Improving the Writing Skills of College Students," Thomas L. Millard, Montclair State College, NJ

   This paper describes an innovative program in maximizing students' writing potential across the curriculum. The effort involved writing papers for submission to refereed journals in lieu of traditional term papers. Emphasis is on prior and current life and work experiences, as well as academic learning. It provides information for immediate "back home" use.

6. "An Interdisciplinary Approach to Medicine and the Humanities," Rene Lawson and Vincent Redman, Ohio State University

   Through the analysis of the literary uses of medical themes, the role of humanities in medical decisions, and the definition of medicine as art and as science, the interdependence of these two fields may be examined. An interdisciplinary approach provides the basis for the exploration.

1:50-12:15 DETAILED PRESENTATIONS

. WISTERIA
. CAMELLIA
. MIMOSA
4. LAUREL
5. DOGWOOD
6. GARDENIA

2:30-1:15 LUNCH – RENAISSANCE III

:15-1:45 Business Meeting, Donald Borchardt, Rutgers, the State niversity, Newark

PAPER SESSION H

ession Chair: George Williams, Burlington County College, NJ

:00-2:30 OVERVIEW PRESENTATIONS – RENAISSANCE IV

1. "Incorporating Writing for Understanding and Individualizing Calculus in a Lecture," Joan P. Capps, Somerset County College, NJ

   Journal writing techniques, added to calculus exercise assignments, improved students' understanding of calculus concepts presented in lecture as well as improved algebraic and problem-solving skills. Requiring students to verbalize concepts on quizzes and tests further enhanced critical thinking and enthusiasm.

2. "Teaching Career Decision-Making," David E. Kamm, Union Beach Public Schools, NJ

   This presentation illustrates curriculum, instructional activities, and materials for teaching the prerequisite thinking skills required for career decision-making. Using Bloom's Taxonomy and The Tyler Rationale as paradigms, methods of sequencing and individualizing career education instruction are discussed.

3. "Assuming the Responsibility for Learning: Student Participation," Martha Nyikos, Purdue University, IN

   The purpose of this presentation is to provide background information on recent learning strategy research and to demonstrate the techniques by which the students can become more actively involved in and responsible for their learning process via these strategies.

✓ 4. "The Integration of Skills and Content," Richard B. Miller, East Carolina University, NC ✓

   Just as students who are expected to absorb content without the requisite thinking skills often fail, students who attempt to master reasoning skills without appropriate content also fail. In this paper I discuss ways to integrate skills and content.

5. "Clarifying a Concept: 'Assessment' of Critical Thinking Ability," C. Blaine Carpenter, Clayton State College, GA

   It is the intent of this presentation to discuss a representative sample of various critical thinking assessment programs in use in educational institutions across the United States. In addition, the conceptual framework for integrating critical thinking into the Clayton State College curriculum and assessment of the Critical Thinking Outcome will be discussed.

6. "Teaching the U.S. Constitution Via Illustrations and Captions," Louis A. Foleno, City University of N.Y. - College at Staten Island

The original Articles and subsequent Amendments are taught by having students provide illustrations and captions that explain the Constitution. The students add title, date, president, historical period and current significance. This is a research group or oral project or any combination necessary to teach a variety of skills and content.

2:40-3:05 DETAILED PRESENTATIONS

1. WISTERIA
2. CAMELIA
3. GARDENIA
4. DOGWOOD
5. MIMOSA
6. LAUREL

WORKSHOP SESSION III
INVITED WORKSHOPS

Session Chair: C. Blaine Carpenter, Clayton State College

3:20-3:30 OVERVIEW PRESENTATIONS – RENAISSANCE IV

A.. TEACHING HOLISTIC THINKING ACROSS THE CURRICULUM, Vincent R. Ruggiero, SUNY - Delhi College, NY

The first half of this workshop will detail the teaching objectives and methods associated with holistic thinking. The second half will identify a variety of interesting assignments and guide workshop participants in developing some of their own.

B. TEACHING THINKING BY DEVELOPING THINKING TOOLS, Curtis Miles and Jane Rauten, Center for Reasoning Studies, Piedmont Technical College, SC

This presentation will explore a program developed for college students, though applicable to junior high and high school students, which helps them become aware of and proficient in the academic use of those thinking skills and tactics which they already unconsciously use in school, personal and career situations.

3:30-5:30 DETAILED PRESENTATIONS

A. WISTERIA/CAMELLIA
B. MIMOSA/LAUREL

Thank you for joining us at ISII '86!

GUIDED DESIGN: SENSITIVITY TO BLACK-WHITE INTERACTIONS WHEN GIVING NURSING CARE*

by

THERESA M. FERNANDEZ, R.N., M.A.
VIRGINIA COMMONWEALTH UNIVERSITY/MEDICAL COLLEGE OF VIRGINIA

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*Presented at the International Society for Individualized Instruction (ISII), A Society for Exploring Teaching Alternatives Annual Conference Proceedings, October, 1986.

"If visitors to this country tried to gauge the gravity of problems in American society by their prominence in class discussion, they would consider that racism is not a major problem" (Noonan, 1983).

This quote reflects precisely the feelings I have had for years about our curriculum. Someone has referred to the omission of black content as racial silence. If you looked over bibliographies for students, you would probably find very few references that would help students to give nursing care and to even communicate adequately with black clients. The problem is, of course, not unique to our curriculum nor to our university.

The Medical College of Virginia Nursing School and Hospitals are a part of the Virginia Commonwealth University and are located in the city of Richmond. They are state supported; and, for the most part, the patient population is primarily black.

I have been using the Guided Design with clinical groups of seven to eight students during the community part of the psychiatric nursing experience. While a white student was doing this Guided Design with her group, she stressed quite openly that I needed to be very specific with my title because the original title was very broad and did not specify black-white interactions.

Three years ago the University accepted the challenge to begin to discuss the problem of racial sensitivity in faculty, students and in the curriculum by accepting a grant which offered two week seminars from 1983 to 1985 to teach faculty about black-American prospectives in their disciplines. The seminars were funded by a federal grant from F.I.P.S.E. (Fund for Improvement of Post Secondary Education). The purpose of these seminars was to encourage frank exploration of racial topics. By discussing the black perspective with colleagues, we became more aware of our own position with regard to black-white issues and then were able to think about helping students to become aware of their concerns with blacks or whites. Even though the grant ended two years ago, the university continues to conduct these seminars with individual schools within the university.

The representation of different races and cultures in our university is not as varied as we hope it will become. Racial prejudice is seldom changed by achieving knowledge or by simply interacting with persons of other races or cultures. Almost all student nurses express real fear and concern about the prospect of having to even visit a black client in his residence.

In this presentation, I plan to discuss three steps from the Guided Design including the objectives, situation, and evaluation. I will share my thoughts and feelings about using the Guided Design. I will relate what happens when students are brought together to examine their feelings and to discover with others fallacies in their thinking about black-white issues in giving nursing care.

Presentation

The main theme of this presentation is to discuss how a Guided Design can be used with student nurses in developing an awareness of and reducing stereotypic responses in nursing care.

A nursing journal article by Hunter and Block (1981) includes an example of a nurse who re-washed a black patient three times because the wash cloth showed that the patient was "still dirty". That nurse was apparently unaware that the pigmented upper layer of black skin normally rubs off when washed. No matter how neat, dignified or beautiful this black person may be, this nurse will fail to see him as he really is. She will see him through an uninformed bias. The nurse is unlikely to revise this invalid judgement about the black client if the subject of physiological and psychological differences in other races and cultures remains unaddressed as it seems to be in most curricula. The result is that prejudices and ignorance will influence the nurse's evalution of the patient and limit the potential effectiveness of the patient's care (Stuart & Sundeen, 1983).

I have written two different Guided Designs. The first one was written for the beginning student and used in the Introduction to Nursing course. The second was written for use in the Psychiatric Nursing course.

The first few times I used my Guided Design, I found that giving it early in the semester was difficult for both the students and for me. We need to know and trust each other before students can discuss racial topics. Now, I give the Guided Design about mid-semester.

I also learned that I had to work hard on becoming more accepting of statements from students that indicated denial of prejudice or anger toward other races. It is natural to want to try to change these negative attitudes toward blacks and others, but prejudice learned early in life takes time to be unlearned.

The learning objectives of the Guided Design direct the student to use a problem solving process; identify nursing problems, unique to black clients; state physiological and psychological needs of black clients; and specify plans for intervention when racial prejudice influences nursing care (Fernandez, 1985).

Before doing the Guided Design with students, I introduce them to the idea of discussing black-white issues by showing a film on racial prejudice. The students also read and share with each other a number of pertinent articles on black culture and black health needs. I am fairly directive during these activities. I find this method is helpful because it is more gradual and controlled in preparing students for the more stressful content of the Guided Design itself. There was a time when I used the film and articles as a synthesis step in the middle of the Guided Design. I have found it disrupted group process.

The following situation begins the process of problem solving steps in the Guided Design and is based on an actual event involving one of the student nurses.

Situation

"You are one of a group of junior student nurses taking the psychiatric nursing course. As part of the clinical experience you will make several visits to a chronically mentally ill client in the home.

You have already been oriented to the community agency and you are now ready to learn about your client by reviewing the chart. As you read the chart, one of your colleagues says, "I'm not going to visit this man. Listen to this; he thinks his T.V. set sends messages from Mars, he was violent before his last admission, and besides, I never rode the bus in Richmond." As she talks more about her client you learn that he is black and in his thirties. (This student is white and around twenty.)

The student is obviously angry. The other students stop to listen to her and the instructor is also listening. You touch her arm and ask how you can help her. Before she can answer, the instructor tells the group that we will have a clinical conference that afternoon to discuss the situation and come up with some ideas about how she can identify and solve her problem" (Fernandez, 1985).

Several written comments on the evaluation of the Guided Design seem to focus on fears of this patient's past psychotic behavior, rather than to consider the possibility of racial prejudice. For example, one student wrote, "Lighten up the situation. Student may only be fearful of violent behavior." Perhaps this is out of a need to deny that racial prejudice could exist in a student nurse. It is very difficult for students new to a helping profession to realize that such problems are real and are with us every day.

The possibility of having to take a bus to visit the client continues to be a problem with every student group. They say they fear for their safety and seem to avoid the realization that the city buses are used primarily by blacks and that aggressive behavior on buses is almost non-existent. One student related to us after her home visit that she personally rode the bus for the first time to go with the client to a clinic appointment at the hospital. She told us she was the only white person on the crowded bus, and that she and her client chatted together for the entire ride. When they left the bus, the patient shared that this was the first time she had ever been in public with a white person. The student was able to admit that she had never been the only white person among blacks before. After this disclosure, they hugged each other and the student admitted to us how overwhelmed she felt realizing how much she cared for this lady.

The Guided Design proceeds through the usual problem solving steps with the focus continuing to be on black-white issues. I have had to accept the fact that many students have never completed the last three steps in the Guided Design. I strongly believe students must proceed at their own pace and I have speculated that the group's degree of success in discussing and sharing each other's values and concerns about prejudice is more important than completing the Guided Design.

Evaluation: The original format used is as follows:

I FOUND THIS EXPERIENCE TO BE:

	VERY	SOME-WHAT	NEITHER	SOME-WHAT	VERY	
STIMULATING						BORING
DIFFICULT						EASY
DULL						FUN
HELPFUL						USELESS
LONG						SHORT

The original format did not lend itself to a numerical analysis. I was satisfied with a subjective scan of each group's response to the Guided Design. For purposes of communication to others, I made some alterations to use the Likert-type scaling, showing the following findings:

TOTAL MEAN SCORE OF A NUMERICAL EVALUATION USING
1 = Unsatisfactory -- 5 = Very Satisfactory

CATEGORY	MEAN SCORE
BORING -- STIMULATING	3.5
EASY -- DIFFICULT	3.9
DULL -- FUN	3.5
USELESS -- HELPFUL	3.8
SHORT -- LONG	3.9

The total mean score was established for four out of five groups who have used this Guided Design (N=31). Considering the stressful nature of the topics, and the inclination of the students to "short-circut" the problem solving process by jumping to an immediate decision, the positive results are impressive. I would have been really troubled if the Guided Design was easy, useless or too short. The tabluation results highlighted the consistent middle of the road stance of the evaluation which I had not been aware of earlier. Perhaps this suggests a need to avoid taking sides on such a debatable and emotional concern?

Other questions on the evaluation asked: Did this experience increase your confidence in being able to give effective nursing care; and, give example(s) of how your confidence was increased, or state how you account for no increase in your confidence.

The results of these questions are as follows: twenty-five responded "yes", three "no", and three gave no response.

Student comments to the evaluation question, "Did this experience increase your confidence in being able to give effective nursing care?" were as follows:

YES, with examples:

- Became aware of how prejudice has an effect upon nursing care. (RN student)
- Realized that when conflicted, need to consider all alternatives before solution. (RN student)

(black student)

- Reinforced steps of nurisng process and problem solving.
- Able to recognize own feelings and others and why they feel that way.
- Found I was able to look at many facets and come up with solutions but need work in evaluating solutions.
- Affirmed my viewpoint that I am not particularly racially prejudiced.

No, with examples:

- Have no problems in working with any racial group. (RN student)
- I feel confident in giving effective nursing care. Design is for undergraduate student. (RN student)

The evaluation also asks for students comments regarding changes they feel need to be made in the Guided Design and why. Some examples follow:

- Deal with more than one situation.
- Leave feedback sheets until end. (Instead of after each step.)
- Client's feelings should be bigger issue.

- Do all at one time, including film and articles.
- Allow students to do design individually if they wish as an apathetic student affected the group.
- Not needed for those of us who are not prejudiced. (2 students)
- Have black person speak with group to help with black opinions.
- Interesting and I liked it.

Evaluation results are based on the following courses and number of students that participated in the Guided Design:

Summer 1986	7 R.N. Students, Undergraduate. Basic Nursing Course -- given by an interested faculty member at her request.
Spring 1986	9 Undergraduate Students in Psychiatric Nursing course.
Spring 1986	8 Undergraduate Students in Psychiatric Nursing course.
Fall 1984	7 Undergraduate Students in Introduction to Nursing Course
Fall 1984	7 Undergraduate Students in Introduction to Nursing Course, did not obtain evaluation.

The FIPSE Project was described as "Having developed within a substantial group of primarily white faculty, new expertise and a sense of commitment to dealing with racial issues in academia" (L. William, 1986).

It helps when there are colleagues in your school who are struggling as you are to involve students in an experience that will help them to function more effectively with black clients. As a result of the FIPSE Seminars, one of the school of nursing faculty completed a survey of our undergraduate curriculum to identify cross-cultural content. The findings revealed that five of the eleven courses surveyed indicated the inclusion of cross-cultural content. However, only one course included reference to such content in the course objectives and standards (F. Fernandez, 1985). A Guided Design prepared by another faculty member of our school entitled, "Resolution of Conflict in the Work Setting" (Bach, 1984), was used in the senior leadership course.

My frustrations about introducing the concept of black-white issues in nursing care into the curriculum stem from an awareness that attitudes, prejudices and values canot be changed through fromal lectures to large classes. The Guided Design appears to hvar been a successful tool for me to use for small clinical groups. It is exciting to realize that change can occur in spite of resistences from colleagues, students and within myself.

The recently published, Guided Design Guidebook (Coscarelli & White, 1986) is timely for me as I am presently considering ways to reach larger groups of students. My confidence level has increaced and curriculum changes are beginning to include racial and cultural learnings in our school and within the university. For example, there will be a three credit course given in the senior year on "The Changing American Family". The course focuses on four groups, Black, Chicano, Asian-American and low-income families.

My plans for the spring semester include working with an interested faculty member who also attended the FIPSE Seminars. We will develop a Guided Design on black-white issues in psychiatric nursing to be given to the entire group of approximately 55 students. Also, I hope to devise a design to be used for all 110 student nurses in their first introductory course next fall.

Further evidence of overall support from the university occurred last month when the Provost wrote a letter to every school to reinforce

Affirmative Action to produce change in black student retention and graduation rates, and black faculty recruitment and retention. Steps to achieve these goals are concretely stated and seem aimed to bring about results.

Conclusion:

I am constantly challenged in working with black-white issues especially now when some would have us believe that racial prejudice no longer exists in our country. White students come into our program not even considering black-white issues as important and they verbally deny the existance of cultural-racial prejudice. It is important to remember that blacks continue to consider prejudice a priority. In a T.V. report on the "Today Show", a Supreme Court case in the fifties was discussed. The Brown Case represents a black family's fight to be able to place their child in a neighboring all white school. The case is in the news now, thirty years later according to the newscaster because of concerns that black students being taught in all black schools are not receiving an adequate education, whether intentionally or by accident.

"Realistic conflict is like a note on an organ. It sets all prejudices that are attuned to it into simultaneous vibration. The listener can scarcely distinguish the pure note from the surrounding jangle" (Allport, 1954). Allport's thoughts symbolize what student groups go through as they struggle with these issues. I plan to continue to promote student-group interactions over black-white issues in nursing and in education, and hope that these thoughts will be helpful to those of you who care to take on, or continue with this challenge.

GUIDED DESIGN: "SENSITIVITY TO BLACK-WHITE INTERACTIONS WHEN GIVING NURSING CARE"

by

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Community & Psychiatric Mental Health Nursing

COURSE: NUR 350 - PSYCHIATRIC MENTAL HEALTH NURSING
LEVEL CREDIT: 6 Credits, Required for Junior Student Nurses

PROJECT TIME SPAN: 2 times per semester (approximately 8 students each block/4 hours each block totalling 8 class hours.)

SUBJECT MATTER: Developing racial awareness and reducing stereotypic responses in nursing care

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SCHOOL OF NURSING
Medical College of Virginia of
VIRGINIA COMMONWEALTH UNIVERSITY

GUIDED DESIGN: "SENSITIVITY TO BLACK-WHITE INTERACTIONS WHEN GIVING NURSING CARE"

Instruction G & H, Synthesis -

The need for pertinent information from the literature is useful in problem solving. Because of time constraints instead of including this synthesis in the Guided Design, you are asked to select one or two articles from the folder provided and be prepared to share what you have learned from the article in a clinical conference.

As further preparation for doing the Guided Design, you will view a film on racial prejudices and afterward discuss your thoughts and feelings with the group.

GUIDED DESIGN - PSYCHIATRIC MENTAL HELTH NURSING
NUR 350

Instructor: T. Fernandez

OBJECTIVE

Upon completion of this project, students will:

1. utilize a problem solving process.
2. identify nursing problems when caring for a black client.
3. state the unique physiological needs of the black client.
4. specify plans for intervention when racial prejudice influences nursing care.

INSTRUCTIONS

1. Use of the outline, The Decision-Making Process, will facilitate movement through the Guided Design.
2. The printed Instruction-Feedback material will model the step-by-step thinking of a professional. The feedback material is not intended to be a model of the only correct answers.
3. Select a recorder who will keep a written record of the group's ideas and will indicate where the group agrees or disagrees with feedback provided.
4. The group will proceed at its own pace within the time frame provided. The recorder will inform the instructor when each step is completed.
5. The instructor will interact with the group as a consultant who will listen and ask questions and also control the flow of the Feedback-Instruction pages to insure that shorcuts are not taken in the decision-making process.

TMF:dwp
rev. 3/24/86

GUIDED DESIGN:
"SENSITIVITY TO BLACK-WHITE INTERACTIONS WHEN GIVING NURSING CARE"

Situation

You are one of a group of junior student nurses taking the psychiatric nursing course. As part of the clinical experience you will make several visits to a chronically mentally ill client in the home.

You have already been oriented to the community agency and you are now ready to learn about your client by reviewing the chart. As you read the chart, Emily, one of your colleagues says, "I'm not going to visit this man. Listen to this; he lives in an adult home in the poorest section of town, he thinks his T.V. set sends messages from Mars, he was violent before his last admission, and besides, I never rode the bus in Richmond." As she talks more about her client you learn that he is black and in his thirties. (Emily is white and around twenty.)

Emily is obviously angry, the other students stop to listen to her and the instructor is also listening. You touch Emily's arm and ask her how you can help her. Before she can answer, the instructor tells the group that we will have a clinical conference that afternoon to discuss the situation and come up with some ideas about how Emily can identify and solve her problem.

Instruction A - State the Goal

"O.K., where do we start? This could be anyone of us," one student remarked. Another student said, "When there's a problem, you automatically know you have to set the goal that you want to accomplish."
WHAT SHALL BE EMILY'S GOAL?

Feedback A

The group talked about many issues, including their own feelings about the problem which they decided could be developmental, psychological, or emotional. Emily is young so it could be that she is simply not ready to interact with any strange male in their own home. It may be fear or fear based on prejudice, or it could simply be that Emily is not prepared intellectually to handle the task.

The group decided they were not in a position to search for THE cause of Emily's problem, so they would try to find a solution.

Two ideas finally emerged: 1) to assign Emily to another client and 2) to help Emily overcome her fear.

As they discussed these ideas the group realized that the first ideas was really a possible solution rather than a goal. Therefore, Number 2 was selected as the best goal.

Instruction B - Component Analysis (of the Different Parts of the Situation)

When one student remembered that it helps to identify the component parts of a situation before trying to jump to a solution. We need to consider things about the client and Emily, and other aspects about the whole situation. The group went to work to IDENTIFY THE MAJOR COMPONENTS OF THE SITUATION. What major factors are present that can be changed?

Suggested categories for listing component parts:

Emily	Client	Other Factors

Feedback B

The major component parts of the situation identified by the group were listed under the following categories:

Emily	Client	Other Factors
prejudicial feelings	prejudicial feelings	where client lives
fear	fear	expectation of visits to his home
unfamiliarity with role	resentment	use of bus or car
unfamiliarity with the geographic area	confused regarding role expectations	alone or accompanied by someone

---

Instruction C - Generate Possible Solutions

"These components look like big areas to consider," one student remarked, "but I guess that we can come up with some ideas for possible solutions." So the group then began to LIST ALL THE POSSIBLE THINGS THAT COULD BE DONE TO SOLVE THE PROBLEM. How can each component be changed?

Feedback C

The group considered some of the solutions that would help to meet the goals and organized them under components as follows:

Emily

- Ignore the racial difference
- Obtain information regarding the sociology and psychology of the black client from the instructor
- Be accompanied by another student on each visit
- Ask for a different client
- Leave nursing
- Accept her feelings of fear and prejudice
- Role play first visit and establishing a contract
- Go to address before day of visit to feel more certain of location and area

Client

- Check how the client feels about being assigned to Emily
- Clarify student role and expectations
- Establish a clear contract

Others

- Assign client to someone else
- Have instructor make initial visits with student
- Get a ride from another student rather than take the bus
- Have client meet student at Mental Health Center

Instruction D - Constraints, Assumptions, Facts

The group felt as if it was really getting somewhere now, but the real challenge came when they began to argue over which solution was the one of choice.

"Before we make a choice," one member said, "We need to IDENTIFY ANY CONSTRAINTS OR LIMITS THAT MIGHT ALTER OUR SOLUTION. ALSO, WE NEED TO MAKE ASSUMPTIONS AND STATE WHAT WE ALREADY KNOW AS FACTUAL."

Suggested categories for listing above:

Constraints (LIMITS)	Assumptions (HUNCHES)	Facts

Feedback D

The group worked hard on compiling a list, but issues came quickly.

Constraints

a. Others may not be available to visit Emily's client, and it would not be fair to assign him to another student.

b. Other students or staff may not have time to help Emily to plan care.

c. Only a limited number of clients were selected as appropriate for students so another assignment might not be possible.

d. Client may live a distance from the Mental Health Clinic and so coming to the clinic would be a hardship.

Assumptions

a. Emily does not want to leave nursing.

b. Emily wants to succeed with this assignment.

c. Racial differences cannot be ignored as they affect every interaction.

d. The need to give nursing care to persons of other races will occur daily in the professional life of a nurse.

e. Nursing care must be as free as possible from racial biases, prejudices or stereotypes. Clients of other races need to be protected against racism.

f. The client may have some concerns about being cared for by a young, white, female student.

g. Achieving awareness of one's own feelings is difficult and often cannot be done without help.

Facts

a. One objective for this clinical experience is that the student visit the client in his home.

b. Having a positive interaction with another person is an important therapeutic accomplishment for a chronically mentally ill client.

Instruction E - Choice

Emily mentioned that the list compiled by the group really helped. She then reached into her backpack for some papers and said, "Our instructor left this format with me to help us to rank each one of our choices!" So the group went to work to consider the constraints, facts, and assumptions as they RANKED ALL OF THEIR SOLUTIONS ON THE FORMAT PROVIDED.

FORMAT FOR RANKING POSSIBLE SOLUTIONS
(Rank by +++, ++, +, NA, -, --, ---)

Instructors for use of format and for ranking the solutions:
The group will "brainstorm" all possible ways to solve the problem and list them on the format. Then, rank each solution by group consensus, +++ being the most useful, and - being the least useful. The solutions with the greatest number of most useful will probably be the ones the group will select to reach their goal.

Possible Solutions	Criteria			
Solutions generated by the group	Effect on patient needs	Effect on student learning and motivation	Effect on level of care	Feasibility

FORMAT FOR RANKING POSSIBLE SOLUTIONS

(Rank by +++, ++, +, NA, -, --, ---)

Possible Solutions	Criteria			
Solutions generated by the group	Effect on patient needs	Effect on student learning and motivation	Effect on level of care	Feasibility

FORMAT FOR RANKING POSSIBLE SOLUTIONS

(Separate page to be given out upon request or if necessary)

By group consensus, the ranking accomplished its purpose as follows:

	Criteria			
Possible Solutions	Effect on patient needs	Effect on student learning and motivation	Effect on level of care	Feasibility
a. Ignore racial difference.	---	---	--	---
b. Obtain information regarding the social & psychological aspects of black clients.	+++	+++	+++	+++
c. Obtain information about the client.	+++	+++	+++	+++
d. Have someone else visit this client.	+++	---	+++	--
e. Get help in planning and implementing care.	+++	+++	+++	++
f. Get a different assignment.	NA	---	NA	---
g. Leave nursing.	NA	---	NA	---
h. Role play first visit and contract setting.	+++	+++	+++	+++
i. Face feelings of fear and prejudice.	+++	+++	+++	+
j. Find out how the client feels about the assignment of a young, white, female student.	+++	+++	+++	+++

FORMAT FOR RANKING POSSIBLE SOLUTIONS

Solutions	Criteria			
Possible Solutions	Effect on patient needs	Effect on student learning and motivation	Effect on level of care	Feasibility
k. Have instructor go with student on initial visits.	+++	+++	+++	+++
l. Ride with colleague to avoid taking bus.	NA	-	NA	-
m. Have client meet student at Mental Health Center.	---	--	-	- or + ?

Feedback E

The group found the ranking of possible solutions to be an easy task. (The instructor's feedback on the ranking order may be obtained upon request.) The group agreed that the following solutions would accomplish their goal.

Emily will:

(c) obtain information about the client.
(h) role play with student group how to make initial visit and set up the contract.
(i) learn about the fear and prejudice that are likely to occur in most black-white interactions.

The instructor will:

(j) talk with Emily's client hoping he can share any concerns he may have about receiving care from a young white female student.
(k) visit with Emily for the first several visits.

Instruction F - Analysis

"Now that we have some idea about what to do," offered one student, "we need to do an analysis to determine all of the factors that must be considered in our solution."

Someone checked the "Decision Making Process" page and found that using questions, Who, What, When, Where and Why? was a good way to analyze the chosen solutions. With that suggestion, the group PROCEDED TO LIST QUESTIONS THAT WOULD IDENTIFY THE COMPONENTS INVOLVED IN THE DETAILED PLANS.

Feedback F

Upon completing discussion of the analysis, the group compiled a list including the following questions:

1. What guides would Emily use to gain information about her client?
2. What information will she need?
3. With whom will she discuss her feelings?
4. When will the instructor meet with the client?
5. What will the instructor do if the client has decided not to comply with the assignment?
6. What will the instructor do when she is present during the visits?
7. How will instructor know when it is OK for Emily to be on her own?

Instruction G - Synthesis (Definition - combination of parts so as to form a whole)

"Now we're getting somewhere, I can see the end in sight!" remarked one eager student. "Not so fast," another student said. "We need more information." We really know very little about the component parts of this situation."

"He's right," another student remarked "LET'S MAKE A LIST OF TOPICS THAT WE WANT TO KNOW MORE ABOUT."

*OMIT THIS SECTION IF PREVIOUSLY COMPLETED IN CLINICAL CONFERENCE.

Feedback G

The group quickly compiled a list of topics about which they needed more information. The following ideas were included:

1. information about black culture,
2. special needs of the black male client,
3. information about prejudice and how racism effects black-white relationships,
4. information regarding common misconceptions about black people,
5. special problems among blacks,
6. communication with black persons,
7. stress and the black person, and
8. guides for physiological and psychological assessment of black clients.

Instruction H - Synthesis: Step 1

When the group shared their list for more information with their instructor, it was agreed that they would go to the library. The librarian was most helpful. He provided the group with a folder of xeroxed articles on black persons and a bibliography of suggested reading that had been placed on reserve by their instructor.

The librarian also recommended that the group view a film entitled "Prejudice - Causes, Consequences, Cures" in the audiovisual room on the eighth floor of Sanger Hall.

After thanking the librarian, THE GROUP DIVIDED UP THE LITERATURE TO BE REVIEWED AND AGREED UPON A TIME TO VIEW THE FILM.

Feedback H

At the next meeting, the group members shared with each other what they had learned from the articles and film. One of the students commented that having some answers makes it easier to continue with the task.

Instruction I - Synthesis

The group members were pleased with the list of questions that they had compiled and so they BEGAN TO "BRAIN STORM" A LIST OF PLANS FOR PROCEEDING WITH EMILY'S VISIT.

Feedback I

The group members were very pleased with their list and presented the following to the instructor:

1. The data base and an interviewing guide will be used to collect data.
2. Data will be obtained directly from the client; from family members, if available; and from staff. Information on the chart will also be helpful.
3. Student group members are already supportive to each other, enabling Emily or any other group member to share thoughts about fear, prejudice and racism with each other in a constructive way.
4. The instructor will meet with the client before the contract is made to encourage the client to express his feelings about the assignment.
5. The client's wishes will be respected even if they are contrary to the instructor and/or student goals for learning. His needs will determine the priorities.
6. In the planning section of Emily's care plan, areas of implementation with which she will need help from the instructor will be indicated.

Instruction J - Evaluation

The group WILL USE STANDARDS TO DEVISE AN EVALUATION PLAN WHICH WILL INCLUDE POSITIVE AND NEGATIVE CONSEQUENCES THAT MAY OCCUR, AND TO INDICATE WHETHER THE GROUP GOALS HAVE BEEN MET.

Feedback J

The group felt at ease in devising a means for evaluating whether or not the goal had been met. Some of the ideas presented were as follows:

1. the completed care plan on Emily's client,
2. the client's verbalizations regarding their experience together,
3. evidence of need satisfaction or frustration in the client's behavior,
4. Emily's verbalizations about the completion of her assignment,
5. the instructor's verbal and written feedback regarding the care given, and
6. Emily's expressed plans for future care of this client.

Instruction K

The group pulled everything together for closure and MADE A LIST OF RECOMMENDATIONS TO LEAVE WITH THE INSTRUCTOR. One of the recommendats was to have Emily act as a resource person to other students as they are assigned to give nursing care to clients of other races or cultures.

Other recommendations:

EVALUATION OF GUIDED DESIGN
"SENSITIVITY TO RACIAL DIFFERENCES WHEN GIVING NURSING CARE"

Please evaluate this learning experience by answering the following questions.:

1. Complete the following sentence by checking the appropriate box.

   I found this experience to be:

	Very	Somewhat	Neither	Somewhat	Very	
Difficult						Easy
Dull						Fun
Helpful						Useless
Long						Short

2. Comment regarding changes which you feel need to be made in this design and why.

3. Did this experience increase your confidence in being able to give effective nursing care?

Yes ________	No ________
Give example(s) of how your confidence was increased.	State how you account for no increase in your confidence.

TF/dwp
1/20/86

BIBLIOGRAPHY FOR ARTICLES USED IN GUIDED DESIGN

Beland & Passos. (1981). (4th Ed.). Clinical nursing pathological and psychosocial approaches (pp. 789-790). St. Louis: C. V. Mosby.

Bloch, B., & Hunter, M. (1981). Teaching physiological assessment of black persons. Nurse Educator, Jan./Feb, 24-27.

Brill & Kilts. (1980). Foundations for nursing (p. 617). Appleton-Century-Crofts.

Greenfield, M. (1983). A dirty little secret. Newsweek, May, 104.

Ibid. (1983). The condescension of whitespeak. Newsweek, April, 100.

Gagnon, A. (1983). Transcultural nursing: Including it in the curriculum. Nursing and Health Care, March, 127-134.

Gary, L. (1977). The black family and implications for mental health practice. Lecture at MCV recorded by Dr. B. Munjas.

Lindberg, et al. (1983). Culture as a subsystem of the person. In Introduction to Person-Centered Nursing (pp. 569-589). Philadelphia: Lippincott.

Ibid. (1983). Table 26-2. Bloch's ethnic/cultural assessment guide. 578-583.

McDonald, C., & Kelly, A. (1979). Black skin problems. AJN, 79:6:1092-1094.

Phipps, Long, & Woods. (1983). Medical surgical nursing. (2nd Ed.). C. V. Mosby, p. 1192.

Roach, L. (Jan., 1977). Assessment: Color changes in dark skin. Nursing 77, 48-51.

Robinson, C. (1980). Basic nutrition and diet therapy (65-66; 159-160).

Stuart, & Sundeen. (1983). Principles and practice of psychiatric nursing (p. 130). (2nd Ed.). St. Louis: C. V. Mosby.

Willie, C. V. (1974). The black family and social class. American Journal of Arthopsychial, 44(1):50-60.

Wolf, et al. (1983). Fundamentals of nursing (p. 349). (7th Ed.). Philadelphia: J. B. Lippincott.

BIBLIOGRAPHY FOR ARTICLES USED IN
GUIDED DESIGN
Page 2

FILMS (Used in Guided Design):

Black and white uptight (1969).

Cosby, B. (1969). Black history, lost, stolen, or strayed.

(1974). Prejudice, causes, consequences, cures. NJ: McGraw-Hill.

THE CENTER FOR INDIVIDUALIZED INSTRUCTION: AN ALTERNATIVE TO THE TRADITIONAL COLLEGE CLASSROOM

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Introduction

The Center for Individualized Instruction (CII) at Middlesex Community College, a suburban college located 20 miles from Boston, is unique. An alternative to the traditional college classroom, it represents a radical departure from the conventional collegiate instructional model and requires adoption of much that is new. This paper traces the evolution of the CII, both conceptually and organizationally, from its beginnings.

The CII, as it exists today, was not established until 1982. Earlier, following the lead of other colleges in the mid-70's and confounded by the extremes of academic diversity in the classrooms, Middlesex Community College established a small learning center within the Department of Learning Resources. Unfortunately, the learning center quickly became identified as a place for students with academic deficiencies, often the fate of instruction that takes place outside of the traditional classroom. As such, it was not able to provide the instructional diversity which was needed, and, in fact, impeded efforts to involve faculty across the disciplines in the much needed reevaluation of the role of teaching in the community college.

In time, it became apparent that another kind of structure was needed, one which would support, confer legitimacy on, and provide leadership in the search for instructional alternatives.

Finally, in 1982, Middlesex Community College created a new academic division, equal in all respects to the five existing academic divisions, and the author of this paper was made the Division Chairperson. The new Division of Collegiate Studies was charged with responsibility for several academic tasks, chief among which was coordination of individualized instruction and alternative instructional systems. The College's decision to incorporate the non-traditional, i.e. instructional alternatives, within a traditional academic divisional structure was a critically important one.

The CII, as it exists today, came into being at that point.

The Conceptual Model

The CII was conceived as an academic center which would introduce a composite individualized instructional system as an alternative to the college classroom across the disciplines. Courses would be given in the CII which would be identical to courses given in the classrooms in content, credit, and credibility. A new kind of teaching faculty would constitute the CII Professional Staff. Different modes of instruction would be used to accommodate different learning styles. A management system would be implemented which would free teachers to teach in a new way and free students to learn in a new way. The CII would combine flexibility and rigor and it would offer opportunities for learning which previously had been denied to many adult students. It would be a place where all students -- smart ones, not-so-smart ones, old ones, young ones -- would be able to go without difficulty, would be indistinguishable from one another, and would learn. The CII would evolve from and be indebted to the creative efforts of those who designed individualized instructional systems over the years: to the programmed text and to those who advocate that programming is a process: to PSI: to the audio-tutorial: to mastery learning theory. And the CII would also reach into the future by use of the instructional technologies of the video and the computer.

Goals and Objectives

From its inception, all aspects of the organization and administration of the CII have been designed to implement the basic principles of individualized instruction:

1. To free the teacher to be more creative in designing teaching/learning activities for and in working with the individual student.

2. To use technology from the programmed text to the computer in order to provide students with a variety of instructional approaches to the attainment of objectives.

3. To provide opportunities for individuals to learn at different rates and in different ways via the instructional design of courses and the educational management system.

4. To enable students to become actively involved in the primary mode of instruction by using instructional materials with a high degree of self-instructional capability.

5. To provide opportunities for frequent testing and guided feedback via the instructional design of courses and the educational management system.

6. To implement a system of integrated design for each course and for the teaching/learning process involving:

    a. stated learning goals or objectives
    b. measurement of students' knowledge and skills before instruction
    c. specified and diversified instructional modes and activities for attainment of objectives
    d. measurement of students' knowledge and skills after instruction
    e. refinement and redesign of instruction in light of student performance.

The CII and the Classroom: Continuity and Coordination

An issue of major concern in the organization and development of the CII is the relationship between the CII and the classroom. In order to achieve the stated objective of providing instruction in the CII that parallels that given in the classroom, mechanisms that insure continuity and coordination were established at the formal and informal levels.

At the formal level, an important step in achieving the desired relationship came with the adoption of an interdisciplinary agreement which specifies procedures to be followed when a course is offered at the CII.

1. The CII will provide students with an alternative to the college classroom in as many courses as there exists a demand and for which the individualized format is suitable.

2. Initiation of a new course to be given in the CII may be made by the Academic Dean, the Divison Chairs, or the Faculty. In each case, there will be consultation with the appropriate Division Chair.

3. Course objectives and/or syllabi will be given to the Chair of the Divison of Collegiate Studies who will conduct research related to the course and produce a design that will parallel class content and be as self-instructional as possible.

4. Within a three-week period, course representatives and the appropriate Divison Chair will review instructional material and make specific recommendations for improving parts which might be designated as weak. A copy of the revised material will be sent to the Division Chair.

Another formal mechanism is the review of CII instructional policies, procedures, and other pertinent material by the appropriate committee of the faculty association. Such materials were presented to the curriculum committee and the academic standards committee. In addition, the Chairperson of the Division of Collegiate Studies sits on the academic council and reports divisional matters to that council and to the Academic Dean.

In addition to the formal mechanisms, continuity between the CII and the classroom is best achieved at an informal level. Every effort is made to encourage a close working relationship between the CII Staff and their counterparts in the classroom by having a mutual exchange at departmental/divisional meetings, curriculum planning, etc.

The best manifestation of the desired continuity is the relationship between the CII and the department of mathematics. The cooperative relationship between the CII and the Division of Health Careers is also noteworthy. The most recent initiation of a collaborative effort with the CII has come from the chemistry department. Also, a search of the instructional materials market is underway in an effort to provide courses for the Division of Business Administration.

Course Materials and Instructional Design

All CII course materials are purchased from the commercial markets and validity and reliability studies are secured where available. The Division Chair researches the commercial market and secures the material for evaluation and adoption. In some cases, notably in the Division of Health Careers, instructional material is referred to the CII by the appropriate department. In the Spring, 1987 semester, for example, the CII will offer the course "Medical Terminology" for that Division. The course materials, an entirely CAI format, were selected and purchased by the Divison of Health Careers and referred to the CII.

After commercially prepared instructional materials are obtained, the real work of instructional design begins. This is done by the CII Staff. Some commercially prepared instructional materials are more complete than others, but most need some degree of change and redesign to insure that each CII course contains the following:

1. Stated Learning Objectives or Outcomes.

   These are listed for and discussed with students prior to the beginning of their study in any CII course.

2. Primary and Alternative Modes of Instruction.

   This critical area involves designing various instructional approaches in order to accommodate students' learning styles or preferences. For example, the primary mode of instruction in MA 1101 (Fundamentals of Mathematics) is the Audio-Tutorial. If students cannot learn in this format, they may change to a programmed text format, which leads to attainment of the same objectives.

3 Supplemental Activities.

   These include skill sheets, language activities, charts, audio-visual-lecture segments, games and simulations, etc. -- in short, a wide range of instructional activities designed to strengthen the primary instruction. Supplemental activities are made self-correcting.

4. Tests

   Each CII course involves extensive testing. Each course contains:

   a. Pre-Course Testing

   b. Placement Testing

   c. Unit or Lesson Mastery Testing

   d. Oral and/or Writing Skill Testing

   e. Post-Course Testing

5. Parallel Items and/or Activities

Original tests are not used for analysis purposes. Parallel items or duplicate activities have been prepared for each item on each test and these are used for analysis of problems and directed re-study.

When implementation of the instructional design is completed, the instructional materials (including syllabi, tests, supplemental activities, multi-media activities, skill sheets, guided study sheets, etc.) for each course are bound in heavy-duty notebooks and are available for examination by the College community.

The CII Educational Management System

For a non-traditional educational structure such as the CII to be effective, it must be managed systematically and the components of the system must be clear to all concerned.

The educational management system in operation at the CII includes: the communications system, the registration/scheduling system; the records-keeping system; the course-management system; and the monitoring system.

1. The Communications System

A. The General Orientation

Students are given a detailed Orientation to the CII before they begin courses. The orientation information is presented in a small-group lecture format and in the accompanying brochure which students keep. The General Orientation is also available on cassette tape.

B. The Subject Orientation

Students are next given a thorough Subject-specific Orientation at which course objectives, course procedures, course syllabi, and other pertinent instructional details are presented by the appropriate CII Staff member. This Subject Orientation is also available on cassette tape.

C. Student Agreement Contract

Upon completion of both the General Orientation and the Subject-Orientation and in conference with the CII Staff member students sign an Agreement Contract in which they indicate that they understand the policies and procedures in effect at the CII and that they agree to same.

D. IP (IN PROGRESS GRADE) Contract

If the IP grade is given, the CII Staff member and the student agree to the conditions governing completion of the course; the conditions are written into the IP contract; and both parties sign the contract, which is then kept in the student's folder.

E. Letters of Special Arrangements

Letters confirming individual course arrangements are mailed to the students involved and copies are kept in student files.

F. Mid-Term Warnings

The CII uses the regular College system of notifying students of academic deficiency at the mid-term point. The formal notification, which is sent by the Registrar's office, is accompanied by confirming letters sent by the CII and/or by individual conferences.

G. Final Grades

The CII uses the regular College system for notifying students of their Final Grades at the end of each semester. The IP grade is reported on the official transcripts.

II The Registration/Scheduling System

A. Course Meeting Times

All CII study is scheduled. There is no drop-in provision. Students select their course meeting times, arranging hours and days in any way that is helpful to them. Once they have selected the course meeting times, however, they must keep them until the end of the semester.

B. Required Hours

Students are required to spend a minimum of 3 hours per week in the CII for each 3-credit course, as they must do in a classroom. Students in foreign language courses and in English-as-a-Second Language courses must spend a minimum of 4 hours. Students may request additional study time, but it must be scheduled. During the Orientations, students are encouraged to add hours beyond the minimum.

C. The College Master Schedules

CII courses are listed on the College's Master Schedules at the normal registration periods. Courses are listed under the CII section and under appropriate Divisions. Thus students can choose between two instructional modes.

D. Continuous Enrollment

Students may enroll in a course at any time during the semester. This option and enrollment in courses not listed on the Master Schedule, but available in the CII, are facilitated by the "Off Term Agreement" authorized by the College Registrar.

E. Continuous Study

The IP (IN-PROGRESS) Grade enables students to by-pass the traditional semester's end and continue courses without interruption.

III The Records-Keeping System

A. Daily Sessions Cards

Once students have selected their course meeting times, they fill out a Daily Sessions Card upon which their course meeting time is printed. This card, which also contains detailed information regarding testing, course progress, and attendance, becomes an integral part of both the records-keeping and the monitoring systems. Daily Sessions Cards are given to students at the beginning of each course meeting time and are collected at the end of each. The Cards are then examined by the CII Staff to identify the student who is having difficulty but who has not communicated with the CII Staff. It also enables the Staff to identify students who are progressing through material quickly and may be in need of acceleration.

B. Records of students' progress in any CII course are maintained extensively. Students' daily progress, testing, and attendance are recorded on the Daily Sessions Cards. Original tests and other instructional activities which bear external evaluations or grades are filed in individual student folders. Back-up records are also stored on computer disks.

C. Attendance and Punctuality.

The door to the CII is closed 15 minutes after the beginning of a course meeting time. Without having made prior arrangements with the CII, students may not enter after that time and are marked absent. If a student is absent for a total of three times and has not contacted the CII, the Daily Sessions Card is removed from the active file and the student is so informed by letter. The student is asked to meet with the CII Coordinator and must do so before he or she is permitted to return to the CII. Subsequent absences result in loss of original course meeting times and/or administrative withdrawal from the course. All records concerning attendance, punctuality, and special arrangements are kept on file.

D. Tests

All tests are stored in locked file cabinets and are kept on file for two years.

IV. Course-Management System

The distinctive feature of the course-management system is the students' control of their progress and learning. This is stressed repeatedly both at the informal level and at the formal level of systems operating in the CII.

A. At the scheduled course meeting times, students arrrive promptly, pick up their Daily Sessions Cards, secure needed primary mode instructional materials, and go directly to fully equipped individual carrels in specialized study rooms.

B. Students derive their primary instruction in any course by interaction with the primary instructional mode: the audio/tutorial, the programmed text, the a/v or video, the computer. Their interaction is carefully defined, directed and monitored by the CII Staff. Throughout the course meeting time, students read, take notes, do self-correcting exercises and activities, write, play and re-play audio and video tapes, test, and meet with the CII Staff on a continuous basis. Passivity is virtually impossible.

C. Mastery Learning is self-imposed by students early in their course work. They quickly learn that they must fully understand one concept or part of a concept before moving on to the next.

D. Throughout the course meeting time, students meet with the CII Staff whenever they cannot understand part of the instruction and/or when they warrant acceleration.

E. Students determine when they are ready to take tests. Tests are administered and corrected by the Testing Room Monitor within the course meeting time. Test results are recorded on the Daily Sessions Cards and the students are then directed by the Testing Room Monitor to the next step:

1. Study of the next unit, if mastery has been demonstrated.
2. Directed re-study of the unit, if mastery has not been demonstrated.
   (Manuals of re-study directions have been prepared by the CII Staff and are kept in the Testing Room for use by the Monitor.)
3. Conference with the CII Staff

Students are permitted to take only one test during the course meeting time. They may re-test a non-mastered unit upon evidence of re-study and/or with the permission of the CII Staff.

Oral and written performances for students in foreign languages, ESL, and English Composition are evaluated by the appropriate CII Staff member. Students in all foreign languages and ESL courses are given private, individualized conversational practice each week, and a half-hour oral performance, for each course, is part of the final examination.

F. Completion of a Course

Students may take the final examination in a course only after completing all prior units at the designated mastery level. The IP grade allows completion of courses after semester's end but is granted only if a student has completed 50% of the course work and has been in good standing in terms of attendance and punctuality.

V. The Monitoring System

A. Testing Room

The Testing Room, which processes approximately 600-800 tests per week, is staffed at all times. Personnel are trained for test correction and monitoring. Policy regarding student behavior in the Testing Room is published. Directions for test correction and guidelines for parallel items and directed re-study are provided with each test in each course. Tests are filed hourly and test security is insured.

B. Study Rooms

CII Study Rooms are monitored by CII Staff on a regular basis. Proper student behavior, in accord with College Policies, is enforced, and an atmosphere conducive to study and to learning is maintained.

C. Student Progress

Student Progress is monitored on a regular and continuous basis. Intervention, where appropriate, is exercised by the CII Staff.

D. CII Staff Assignments

The CII Coordinator supervises the day-to-day operation of the CII and is responsible for insuring maximum Staff monitoring of students and their course progress.

The CII Professional Staff

The CII Staff consists of five (5) full-time professionals, nine (9) part-time professionals, one (1) Division secretary, two (2) Testing Room Monitors, and four (4) Staff Assistants.

Each professional staff member in the CII is a teacher and a subject-matter specialist. Each brings experience from the traditional classroom. But the nature of individualized instruction requires that they develop new knowledge and new skills and that they bring new commitments to students and to the teaching/learning process.

The academic backgrounds of the professional staff reflect the interdisciplinary focus of the CII. Each has major responsibility for an academic speciality, but each becomes familiar with all course materials; thus, the CII Staff is able to function as an instructional team. The Staff's basic commitment is to the active involvement of students with impeccably designed, self-directing instructional materials as the way toward learner independence.

This commitment means that their relationship to teaching is considerably different from the way it was in the classroom. They learn to talk less, to tell less, to show less; instead, they learn to elicit the talking and telling and showing from the student. To a student statement "I don't understand any of this" they respond by helping the student back up through the instructional sequences to find out for himself/herself where the not knowing started and why.

Their major responsibilities are to provide a sound instructional design in their courses, direct students' interaction with the design, monitor and evaluate course progress and intellectual growth, analyze components of the instruction, and redesign the instruction as often as necessary until it insures maximum student learning.

CII Students

Students take courses in the CII mainly for the following reasons:

1. They want to go faster than they can in a classroom.
2. They want to go slower than they can in a classroom.
3. They like the self-paced, individualized format.
4. They like the flexibility which CII Scheduling and continuous enrollment/continuous progress permit.

The major difference which students identify between classroom sections and CII sections is the degree of personal accountability and the absence of anonymity. The CII focus is on the individual and his or her progress through a course, a progress carefully monitored by the CII Staff. Students know that mastery (normally at 80%) must be demonstrated on a test or they may not continue to the next segment of the course. They know that they must complete specified supplemental work before they are permitted to re-test. They know that they must complete all course work or they may not take the final examination. They know that there is no way to "cram" in a CII course. They know, too, that they must be punctual and that they must be regular in their attendance or they will not be permitted to continue in a course.

Student Evaluations of Instruction are given each semester, with a completion rate of 93%. The Evaluation Form parallels that used by faculty in the classrooms. Evaluations of CII courses and instructors are generally favorable. To the question "Would you take another course in the CII?" the Yes response is consistently between 85% and 90%.

Individualized Instruction is not meant for all students, however. Those who learn best in a group setting, or who desire anonymity, or who accept borderline academic performance in themselves are not suitable for the individualized format.

A major goal of CII future planning is to implement a process whereby student learning style preference is measured and then used to recommend enrollment in the appropriate instructional setting - either classroom or CII.

Conclusion

Student Evaluations and comparative data regarding CII and classroom instruction emphasize that the quality of instruction at the CII is high and that the educational experience is a positive one for students.

The CII serves the needs of the increasingly large number of non-traditional students for whom work, family, and financial responsibilities necessitate a more flexible academic model for taking college courses. It also serves the needs of the many students of all ages who learn in ways which the traditional college classroom cannot accommodate.

The CII also has contributed toward modifying some traditional educational perspectives. It has helped to strengthen the viability of multiple modes of instruction at the college level and has helped to promote the value of providing college students with a choice of instructional formats. It also has encouraged reconsideration of the traditional college classroom as the exclusive domain for providing college courses.

In conclusion, the CII looks to the future with enthusiasm, certain that its impact on the College, in its brief history, its assimilation into the curriculum,, and its academic credibility are substantial indicators of future achievements.

15th Annual Conference of the
INTERNATIONAL SOCIETY FOR INDIVIDUALIZED
INSTRUCTION, October 9-11, 1986
Atlanta, Georgia

Theme: Thinking Across the Disciplines

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TITLE OF PROPOSAL: METACOGNITION AND HIGHER ORDER THINKING: AN INTERDISCIPLINARY APPROACH TO CRITICAL THINKING IN THE HUMANITIES

ABSTRACT:

An exploration of critical thinking as well as curriculum development and teaching strategies. The centrality of the arts of Socratic questioning, accurately reconstructing opposing points of view (reciprocity), and engaging in constructive intellectual exchanges (dialectical reasoning) in an interdisciplinary setting will be discussed and illustrated. Special focus on Foreign Language curriculum.

SUMMARY:

Higher order thinking is active and sustained cognitive effort directed at solving a complex problem, with a complex problem being one that requires a student to integrate different sources of information, consider alternative perspectives, make critical judgments, and develop and test hypotheses. There is every reason to believe that critical thinking ought to be the major focus of educational reform. If a person is adept at thinking critically, he is adept at gathering, analyzing, synthesizing, and assessing information, as well as identifying misinformation, disinformation, prejudice, and one-sided "monological" argumentation. A student with such skills will have the tools of lifelong learning. Such skills are developed when students are given extensive and continuing opportunities to construct and assess lines of reasoning from multiple conflicting points of view, exercise their creativity, and perceive an underlying interrelationship among a variety of information sources. But beyond the critical and creative skills, it is essential that students be encoraged to reason dialectically or dialogically, that is, empathize with and reason within points of view they oppose as well as within those they support. In spite of profound epistemological differences, the existence of common tasks involved in such higher order thinking-- involving both the cognitive and affective domains-- raises the possibility of transfer of domain-specific critical skills from one discipline to another. Such "tasks" might include: evaluating sources, remaining open-minded, defining the meaning of terms, assessing evidence, using logic, tracing implications, identifying presumptions, constructing simulations.

Critical thinking should do more than equip students for the academic environment, preparing them also for postclassroom life-- i.e., the ability to use knowledge in the real world context. Critical thinking defined in this framework is thus seeing through the surface of things, events, and people to the deeper realities beyond the classroom walls. In a more specific sense, this presentation will explore convergent and divergent social organizations in the classroom whose purpose is to encourage critical thinking and promote natural elements of critical thinking such as sharing ideas with others, questioning others, listening to others, defending one's position, and respecting alternative ideas. Video* illustrations of the Multi-Media Program, the student-instructor Symposium, and the Educational Institution-Community Teach-In will demonstrate interdisciplinary pedagogical techniques which extend beyond the classroom as adjuncts to critical and creative thinking exercised in the classroom setting.

*From courses taught by the author

Some Conference Issues in My Proposal:

--How does traditional intra-disciplinary education provide an obtaacle to independence of thought?

--How is critical thinking fundamental to all forms of reference and how do we use it to think across and beyond disciplinary boundaries?

--How can micro-skills be orchestrated into macro-abilities in critical thinking?

--How can the instructor provide an atmosphere to become comfortable in thinking dialogically and dialectically in the classroom?

--What can be done to break down the traditional intra-disciplinary allegiances that college faculty typically have, so as to foster greater responsibility for cross-disciplinary critical thinking instruction within discipline-based classes?

--What can be done to foster more "issue" oriented classes in education and to play down memorization of text and lecture materials?

----What is the impact of simulations (based on real-life and hypothetical situations) on critical and creative thinking processes?

-- How are the critical and creative thinking processes intimately related?

Besides the Video excerpts of student presentations, a Bibliography on further reading on the subject as well as other informative handouts will be provided.

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THINKING ACROSS THE DISCIPLINES

METACOGNITION AND HIGHER ORDER THINKING: AN INTERDISCIPLINARY APPROACH TO CRITICAL THINKING IN THE HUMANITIES

Much of the way we talk about education seems to presuppose an image of the student as a retainer of, rather than a processor of, experience and information. Yet, research repeatedly demonstrates that learning is best thought of as a process of inquiry. The task of learning is primarily one of relating what one has encountered (regardless of its source) to one's current ideas. The student who learns something is the one who understands a new idea (which requires it to be located in a semantic syntactical network of concepts), is the one who judges its truth value (which requires relating the idea to appropriate standards of evidence), and is the one who can judge its consistency with other ideas (which may require alterations in the overall conceptual organization). To learn an idea in any other way is to acquire a piece of verbal behavior which one emits to a stimulus, rather than to understand an idea which one can employ in an intellectually productive way. People are not passive and reactive receptacles into which we can pour the "right" values, the "right" answers, the "right" ways of thinking. People are active and creative beings who need the opportunity to determine goals, issues to be discussed, and the means of evaluating themselves. They learn when they feel that they are a part of what is going on-- when they are personally involved. Learning is not poured into people, learning emerges from people. Essentially, learning takes place through the experiences which the learner has, that is, through the reaction he makes to the environment in which he is placed. Hence, the means of education are educational experiences that are had by the learner. The instructor can provide an educational experience through setting up an environment and structuring the institution as to stimulate the desired type of reaction.

Given that learning is being viewed as a rational activity here, the important questions in higher order thinking are the way learners incorporate new conceptions into current cognitive structures, and the way they replace conceptions which have become disfunctional with new ones. In order to know his environment, one must act upon it and therefore transform it, displacing, connecting, combining, taking apart, and reassembling it. Perception, learning, and reasoning (cognitive skills) play a role in this process of course, but the direction of the mind in exactly how to deal with a problem and to arrive at a viable solution (metacognitive skills) are crucial to creative interactive thought. In this approach in which learners make their own sense of inputs three processes may be distinguished: conceptual development, conceptual resolution, and conceptual change. Conceptual development involves integrating and differentiating the many concepts of a segment of school knowledge without particular regard to one's beliefs and commitments to ideas about the world. Conceptual resolution, on the other hand, does concern the separate concepts and involves resolving differences in meaning between the real-world uses of those terms and their curriculum use. Cultural stereotypes might persist, for example, in a foreign language context if personal misconceptions are allowed to dominate over instructional insights to the contrary. If, however, the learner abandons his commitment to his set of conceptual understandings by adopting another irreconcilable set, conceptual change is achieved. This abandonment or accomodation is not a component of conceptual learning in every instance. Assimilation of ideas wherein major conceptual revision is not required may result as well. Conceptual change views, however, are important to metac ognition for they emphasize the transformation of conceptions in the process of learning rather than the mere accumulation of bits of unrelated information. New ideas should not just be added to old ones. They should instead interact with them, sometimes requiring the alteration of both. The deeply entrenched compartmentalization of knowledge, the increasing sophistication of propaganda and mass manipulation techniques, the continuing dominance of rote memorization and recall of facts as modes of learning, the growth of television and the electronic media, the increasing conflict of opposing ideologies in the global sphere, the acceleration of misunderstanding and stereotypes in international politics, the growing desire for simplistic explanation of life with opposing groups being identified in an essentially manicheistic manner-- all argue for the pressing need for fair-minded critical thinking skills and the ability to interrelate varied and often conflicting views, concepts, information.

Foreign language Curricula and Metacognitive Strategies

A foreign language is an ideal vehicle for modeling the process of learning: organizing a whole body of unchartered territory, identifying, using and evaluating various resources, setting learning objectives, and judging whether goals have been achieved. Being less familiar with the language, culture, history, and author (in the case of foreign language literature courses), the student must exercise a wide range of skills. Primary among such skills are the capacities to develop, test, and affirm or recompose hypotheses; to recognize patterns of internal logic and external implications; and to draw conclusions from evidence. In short, the foreign language curriculum can make a significant contribution to students' development of problem-solving skills from the stage of inference through to that of analytic thought processes. The strategies of conceptualizing, analyzing, evaluating, and synthesizing new experience are inherent in the study of any language whether it be one's native language or a foreign language.

But it is in the expansion of the foreign language program to other disciplines within the Humanities wherein the most challenging aspects of metacognition and creative thought lie. Foreign language courses offer myriad opportunities to contribute to broad educational goals. Moreover, because language is the key to all learning strategies in all disciplines, language faculty have a special responsibility to students and colleagues in other disciplines to provide leadership in developing broad educational goals for students and in conceptualizing departmental roles to achieve these objectives. This is not to say that every effort must be inter- or multidisciplinary or that course pairing or team teaching must be employed. Each of these teaching strategies is laudable in its own framework, but may not always be administratively feasible for the entire curriculum. It is entirely possible to be "interdisiciplinary" in approach in the classroom in a much less formal manner. In this context, it is the instructor's guidance which allows the students to generate ideas and novel approaches to the subject each reflective of his own experiences and specific disciplinary training. This paradigm advances the idea that the deepest objectives of liberal learning-- flexibility of mind and self-reflection-- can best be developed by teaching forms of thinking, rather than by introducing students to specific disciplines. This "modal" approach relies heavily on the architectonics of knowledge, on the superstructure of thought processes and ways of investigation that are held to be common among groupings of disciplines. A creative developmental approach to instruction should thus be toward greater student autonomy, toward tolerance for ambiguity and complexity, and toward the perception of an instructor as a resource, not as an external, authoritative repository of knowledge.

Vygotsky's Theory of Cognitive Development and Creative Group Interaction.

Effective teachers care passionately both about their subject matter and about their students. They are concerned with getting their students to hone their skills in writing and speaking, to extend their abilities in critical thinking and analysis, and to develop their capacities to synthesize, imagine and create. These capacities and skills are the truly enduring effects of higher education. In teaching environments, therefore, adults and more capable peers can describe, demonstrate and explain strategies relevant to task completion. In addition, they can monitor and regulate the learner's problem-solving efforts, keeping them goal-directed. Thus, the externalization of cognitive skills and the transition from other- to self-regulation may be assisted.

We cannot learn what we have not experienced. We learn something roughly in proportion to the degree of experience that we have of it. That being so, the educator should provide learning experiences for his students that reflect the proportions of the objectives that he has already established. The nature of the acquisition of foreign lasnguage skills demands a rich, varied and intensive contact with language-- an active role on the part of the learner. Since second language acquisition is the product of highly complex networks of relationships between linguistic items, it can be learned only if the language is experienced sufficiently for those networks to be built up in the learner, as is true in the case of the mother tongue. Creative Group Interaction effectively combines the cognitive aspects of language learning with the affective aspects of the uniqueness of self. In addition, student-teacher, individual-group, classroom-community relations are enhanced by a group project which allows for individual expression in the target language and, at the same time, peer cooperation and class pride in a socio-cultural and linguistic accomplishment. Toward the end of personalizing foreign language instruction in a non-individualized University setting and encouraging individual imagination and creative thinking, the Creative Group Interaction project requires that students participate in a multi-media, student-directed ensemble exploring a cultural or literary topic through a medium which best suits the student's particular talents. The integration of the foreign language in the program together with relevant course readings and discussions constitute a major focus of the program, which is generally open to the campus community and the public at large. It is important to mention here that many students in our American universities enrolled in lower-division language classes are staisfying a foreign language requirement and have no further motivational factors influencing their study of the language. Thus, it is all the more essential that students become involved, so that interest will not wane and so that a positive experience of foreign language study may be attained. Further, the individualized multi-media projects in which students participate seek natural language use outside the classroom in a well-structured social interaction situation, thus breaking up the traditional classroom student-teacher relationship by taking advantage of the student's personal interests and preoccupations. In each student-oriented instructional program the interrelationship between language and culture, language and ethnicity, and their attendant social and political implications are shown to be important components of the presentation.

Indeed, the claim that learning is enhanced in such social situations is in no way unique. In addition to his widely accepted view that knowledge is socially transmitted, L.S. Vygotsky claims that cognitive processes are transmitted through social interaction. Joint participation in an activity permits cognitive processes to be displayed, shared and practiced, so that the learner is able to modify his or her current mode of functioning. Secondly, the adult or more capable peer lightens the cognitive "workload" for the learner by taking responsibility for some parts of a task while the learner concentrates on one subcomponent. In current terminology, the expert assumes metacognitive control of the situation, monitoring the novice's activities to ensure that they are appropriate for the task, goal-directed and completed successfully. The expert's metacognitive control is essential in that the novice can gain awareness of and control over mental processes only after those processes have been used and practiced. Moreover, in fulfilling the executive function, the expert has a chance to model important metacognitive processes for the learner. In such a setting involving interactive learning as well as an interdisciplinary approach of multi-talented individuals to convey an idea, a taxonomy of metacognition for planning is suggested. The metacognitive scheme that emerges contains knowledge about human purposes, integrating group desires and values, and what planners call time lining. The focus of knowledge about human purposes might entail such aspects as knowing what people seek to accomplish, knowing thatfacts and raw information have no meaning in the absence of purposes, that purposes can be hierarchically arranged, and that establishing purpose hierarchies is as much an affective process as an analytic, logical one. The focus of knowledge about integrating group desires and values might entail a recognition that members of a group are quite diverse in desires and values, that desires and values are often hidden in people and require extensive fleshing out, that integration is a synthetic process that must avoid the common pitfall of camouflaging or submerging some members' interests and values to those of others, and that effective group integration requires a group process model in which people work as colleagues with equal status, authority and importance,. The focus on time lining entails an appreciation of how human plans get carried out over a span of time , an understanding of the different phases of a planning cycle, the temporariness of any solution, and the linkage between particular solutions and the specific circumstances-- positive or negative-- under which the task is undertaken.

Numerous studies have shown that there is a close interrelationship between underachievement, failure, and increased negative attitudes. It seems reasonable that the reverse can also be assumed, that success and positive attitudes are related. The successful production of a cultural program from an interdisciplinary perspective by the students themselves in the foreign language thus has a significant impact on the student's self-image and his self-esteem. He feels important as an individual as well as a representative member of the group. He learns to trust himself as a learner and to realize his potential as an individual to make a significant contribution to a class project. Thus students' own motivation levels seem to be increased within the CREATIVE GROUP INTERACTIVE PROCESS. In addition, the following attendant language functions seem to be reinforced by such activities:

--Personalized instruction (instruction assisting student in expressing his/her ideas in the language being learned): Cognitive funtion.

--Specific talent/discipline brought to the performance/personal interpretations: Affective/imaginative function.

--The foreign language used to convey a message about the real world: Representational or informative function.

--Taking the perspective of another culture in a situation alien to individual experience: Empathetic function.

In the structured interaction afforded by Interdisciplinary Creative Group

Activities with their problem-solving focus, the instructor is allowed to personalize foreign language learning even in a non-individualized setting. Such activities encourage imagination and creative thinking and, to a greater extent, open the way to a variety of learning modes.

Vygotsky's claim that psychological processes appear first on an interpersonal level and only later on an intrapersonal plane emphasizes the dynamic nature of cognitive development. Cognitive abilities are neither magically generated in social isolation, nor innately given, nor passively assimilated. Rather, nascent skills emerge and are refined as learners actively participate in supportive contexts that are structured by others.

Cognition, Metacognition and Creativity.

There is a widely held belief among educators and the general public that teaching causes learning. Instructors should negotiate the meanings of the material under study not just teach basic facts to achieve near rote-mode learning. Yet, even with quality educators it must be recognized that learning is a responsibility that cannot be shared-- it must be consciously pursued by the learner. However, the teacher has a responsibility to provide the student with opportunities to help him grasp the meaning of the material studied so that he can choose (or choose not) to learn it. Typical course evaluation methods do not require use of high order, broad, explanatory concepts and/or integrated frameworks of conceptual knowledge. As a consequence, when course examinations are the criterion of achievement, experimental approaches that emphasize use of broad, explanatory concepts and integration of concept meanings will produce little or no improvement in performance. This kind of experimental approach frequently results in some initial decline on conventional course evaluation measures as students struggle to modify their learning patterns from more-rote-mode to more-meaningful-mode approaches. But after this period of adjustment, students may equal or exceed their conventional-learning counterparts. The central focus of all studies dealing with higher order thinking and creativity is always on the nature of problem solving and evaluation of instructional strategies to improve students' problem solving abilities. Socratic questioning and dialogical practice are often considered significant techniques in the development of problem-solving skills , particularly in the process leading from inference to analytic thought. Such processes are designed to foster the habit of reflective thinking rather than the habit of looking to an instructor, a book, or a formula for a ready-made answer. A Socratic questioner probes deeply for reasons, clarifications, explanations and evidence, helping us to see what grounds or lack of grounds we have for our beliefs. At times, the technique of reciprocity is used in interactive group exchanges (as opposed to didactic lectures). This process allows the student to enter into points of view which he opposes, reasoning within them (an exercise in conflict resolution). Herein we can clearly see the interaction among the processes of cognition, metacognition and creativity most clearly.

Cognition deals with the acquisition, retention and manipulation of meanings. These meanings are relational. Sensation, perception and attention deal with the "extractions" of relations from our environments; memory is, by and large, the "storage" of meaningful relations and their use in thought and problem solving. Understanding the nature of relations, therefore, is a giant step toward understanding co gnition. These basic conceptual relations exist in all disciplined knowledge. Obviously, each discipline investigates different phenomena, but each deals with conceptual relations, for relations underlie all meaning. Metacognition refers to a person's cognition about cognition, that is, the person's knowledge of cognitive processes and states such as memory, attention, knowledge, conjecture, illusion. Of interest here is not how the person executes these processes but what he knows and believes about these processes. The premise behind research in this domain is that persons not only cognize about objects, events and behaviors, but more importantly they also cognize about cognition itself. They form and hold conceptions about how the mind works, about which mental problems are difficult, which easy, about their own mental states and processes. Creativity, making use of both cognition and metacognition, is the ability and emotional proclivity to form higher order integrative reconciliation, that is, the meanings of two or more concepts are seen as related in a new and significant way. Rote learning not only fails to provide the basis for integrative reconciliation but tends to inhibit search for it as does much of school learning and evaluation. As new knowledge is acquired through meaningful learning situations, however, subsuming concepts (the functional unit in the memory of each individual) undergo progressive differentiation. In this way, new events or objects or concepts labeling regularities in new events or objects are seen as substantively related in the form of new propositions that include the original subsumer. Progressive differentiation and integrative reconciliation are not principles of instructional design, but are key learning principles.

People become educated, as against trained, insofar as they achieve a grasp of critical principles and an ability to choose, organize and shape their own ideas and living beliefs by means of them. Education is not a mere piling up of more and more bits and pieces of information. It is a process of autonomously deciding what is and what is not true and false. It implies a self-motivated action upon our own mental nature and a participation in the forming of our own character. It is a process in which we learn to open our own mind, to correct and refine it, to enable it rationally to learn; thus to empower it to analyze, digest, master and rule its own knowledge, to gain command over its own faculties, to achieve flexibility, fairmindedness, and critical exactness. By teaching critical thinking within an interdisciplinary and student-centered, active-oriented setting (utilizing the cognitive, metacognitive, and creative skills to their maximum), educational institutions can perhaps begin to become, as they should be, leading institutions in society, paradigms of rationality, helping an irrational society become what it itself has said is its own highest goal: a free society of free and autonomous individuals.

"The Contract- An Individualized Approach to Competency-Based Learning and Evaluation"

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The Clinical Contract -
An Adult Learning Strategy

The focus of education today is on producing graduates who can function competently in the real life work situation. With the explosion in new high technology and rapid advances and changes in science, it is no longer possible to teach students all the advanced knowledge and skills in a particular field. The challenge for the teacher today then is to produce students who are self directed and who are self motivated life long learners.

With this focus in mind, the teacher becomes a facilitator of learning with the focus on what the student needs to learn rather than on what is to be taught. Learning becomes an active, creative process in which the teacher, as a learning guide, identifies basic competencies in knowledge and skills. The teacher and student then work together to identify the learning strategies and criteria for evaluation. The end result of this process is that students view learning as an exciting process. They are actively sharing the responsibility for planning and operating a learning experience and have a feeling of commitment toward it. The learners perceive the goals of the learning experience to be their goals and their success or nonsuccess to be determined by their ability to accomplish objectives.

The clinical contract is a learning strategy which allows the student and faculty to identify both learning strategies and criteria for grading of C, B, or A. C is the minimum criteria the student must accomplish to meet the standard for a particular competency. The contract is participatory in that the student negotiates with faculty, with the end result of a binding contract for both parties.

The Role of the Teacher and Learner

Initially, the teacher tries to set a learning environment based upon mutual trust and respect, mutual helpfulness and freedom of expression. During the first few class days the teacher outlines the learning competencies and diagnoses the gap between the expected minimal level of performance and the learner's present level of performance. As a co-learner in the spirit of mutual inquiry the teacher contributes his resources as both the student and teacher formulate learning objectives and strategies to attain them. As the student and teacher work together, the teacher shares his expertise about the available resources or options and assists the learner to decide among these options. Whenever possible the teacher helps the student to use their past experiences as resources for learning and tries to make the new learning meaningful and practical. After the students have identified learning strategies, the teacher and student develop mutually acceptable criteria and methods for measuring learning outcomes.

The Clinical Contract

The clinical contract is composed of three parts: the competency, the learning strategies and the evaluation criteria.

The Contract

1. Requires the student to be self-motivated and self-directed,
2. Identifies learning outcomes, resources, strategies.
3. provides criteria and means for validating that learning has taken place,
4. specifies the objectives, goals of learning, and competencies the student will attain,
5. specifies who will do the evaluation and at what time during the learning experience.

Design for Implementing the Clinical Contract

1. Identify the theoretical basis for performance. Develop a comprehensive set of specific goals and behavioral objectives which are performance based. Develop judgmental criteria for acceptable levels of performance behaviors for each of these objectives. Criteria should be realistic and able to be accomplished by the student within the constraints of the teaching situation.
2. Identify competencies the student must perform to complete the course satisfactorily and at what performance level. Competencies should be derived from course objectives and include knowledge, performance, and attidudinal behaviors.
3. Diagnose the student's entry behavior.
4. Student and faculty jointly design the clinical learning plan.
5. Student and faculty identify criteria which will validate evidence of clinical learning.
6. Student presents evidence of learning, facilitator assigns grade.

Within the contract content, the teacher and student:

1. Program competency
    A. What performance criteria is minimum level for passing?
2. Behavioral objectives
    A. Are they clear and concrete?
    B. Do they describe what the individual is undertaking to learn?
    C. Can they be accomplished? Can the accomplishment be measured?
3. Learning strategies
    A. What are the resources, are the methods and techniques proposed for making use of the resources effective? What are the learning activities?

4. Accomplishment
    A. Is the evidence readily measurable and defined?
    B. Is the evidence convincing?
    C. Is the criteria clear, relevant, and appropriate?
5. Evidence of accomplishment
    A. Is the differentiation between C level, B level, A level objectives reasonable?
    B. Does C level reflect minimum expected competency?

The clinical contract is developed and finalized within the first few class days. The student negotiates with the teacher for an A, B, or C grade based upon identified outcome criteria for each of these grades. About mid-semester the student is given the opportunity to renegotiate for a grade or develop alternate learning strategies. At the end of the semester the student presents evidence of attainment to the faculty facilitator.

Conclusion

As I have used the contract in my teaching practice, I have found that students are initially uncomfortable with settings goals and identifying learning experiences. As they become more self-directed and gain confidence and trust, they enjoy the experience. Most of the students feel as if this is truly an adult learning experience.

References

Beare, P. (1985). The clinical contract - an approach to competency-based clinical learning and evaluation

Knowles, M. (1975). Self directed learning: New York: Association Press.

Mager, R. (1984). Preparing instructional objective (2nd Ed.). Belmont, CA: Fearon Publishers.

Teaching Critical Reading As A Way Of Teaching Critical Thinking

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For the past sixteen years I have been teaching political science at Oakton Community College which serves the North and Northwest suburbs of Chicago. One of my primary objectives during this time has been to help my students realize that on the important questions of politics there is no one right or wrong answer; that there are many legitimate, defensible approaches to solving public policy issues; that these approaches are generally shaped by one's ideology; and that intelligent people, acting in all good faith, may never agree on what course of action to pursue. At the same time I have wanted my students to realize that this does not mean there are no answers and therefore everything is relative, but rather that even if they were never to take another course in political science they would have an obligation to develop their own political views, an obligation they don't have the right to give up by blindly accepting what they hear from politicians or political "experts", (including me). In other words, I have wanted them to develop the ability to intelligently analyze and evaluate the things they hear and read, in the process developing their own views and the ability to defend them.

In retrospect I realize that I expected my students to learn all this in some magical way. I lectured on it (eloquently, I would like to think). I explained and defended the various views on a given issue, thinking this would somehow help them realize they had a right to their own views as long as those views were well thought out. But I did not give the students a formal chance in class to develop the thinking skills I so valued. I guess I thought they had already learned the skills and all I needed to do was let them know they had a right to use them.

Then, in 1985 I attended a conference on critical thinking sponsored by the University of Chicago. Suddenly, I found that I had some labels I could use to describe what I had been trying to do. In addition, I came away with the realization that I needed to make some changes in the way I was teaching, changes that would help my students develop their critical thinking skills and apply them to political issues.

Among other things, I began working with Lynda Jerit, one of my colleagues from Oakton's English Department, on the development of a series of reading and writing asssignments for my course in International Relations. I approached the task with a full measure of anxiety: what did I know about developing a well constructed assignment? After all, I used to simply say to my students: "Go write a research paper, and if you don't know what that is, ask your English teacher."

Fortunately, my choice of Lynda as a mentor was a good one. She has studied writing at the University of Iowa and has a wonderful ability to help a teacher think through exactly what s/he wishes to accomplish in a writing assignment. Through numerous drafts she kept prodding me to clarify my thinking and then put it down on paper. And she continues to help me as I engage in ongoing revision in the light of student feedback.

The result is a series of five writing assignments that focus on the critical thinking skills needed to intelligently read political articles that appear in newspapers and popular magazines, the types of writing that students will be exposed to for the rest of their lives.

What I think is most important about these five assignments is that each of them begins with a lesson that teaches the specific skill to be employed in the reading/writing assignment: first, distinguishing fact from opinion; second, determining the author's point of view and how it affects what s/he says; third, detecting fallacies; fourth, comparing and contrasting articles that take different positions on a single issue; and fifth, the skill of analyzing and eveluating a given article. In the process of teaching these skills I also introduce the students to the research and writing conventions of the political science discipline. Perhaps equally important is the fact that a minimum of class time is spent on teaching these skills since the assignments are all written up, bound, and sold in the bookstore as a required text.

Something else came out of the University of Chicago Conference that is important to mention since it provides something of a theoretical framework for my reading/writing assignments.

In addition to me, five other Oakton faculty attended the conference and we started meeting every Friday afternoon to educate ourselves on critical thinking. Eventually we began planning a two semester, weekly seminar for ourselves and other faculty on the whole area of critical literacy: critical thinking, critical reading, and critical writing across the curriculum. We applied for and received a FIPSE grant to support the seminar, as well as a number of other initiatives in this area. We're currently halfway through the first semester of the seminar with twenty participants, including both vo-tech and baccalaureate faculty.

One of the things we quickly came to realize is that critical thinking means different things to different people, with many of the experts seemingly convinced that their view is the only correct one. Needless to say, for us "non-experts" this was disconcerting. Fortunately, in our seminar we have had several guest speakers who have specifically addressed this issue, namely Neil Browne and Stuart Keeley from Bowling Green and Kathryn Mohrman from Brown. In addition, I have done a great deal of reading around the topic. Without going into all of the details, let me give you my conclusions: there is no one thing that is critical thinking. Rather, there are many aspects of critical thinking such as problem solving/decision making, informal logic, disciplinary paradigms/modes of inquiry, question asking, and others. Some of these skills are required more in one discipline than another. No one person can be expected to teach all the skills of critical thinking. Instead, each of us has the responsibility to teach those skills which are most needed in our discipline. In the case of political science (as well as many other disciplines) I think those are the skills of informal logic, for these can help the student to intelligently study political issues, analyze and evaluate the competing views of how to deal with those issues, and arrive at a well thought out position which s/he is able to defend.

Let me turn now to an outline of the critical thinking skills taught in each of the lessons. In the process I will mention the disciplinary conventions that are also discussed. I will summarize the first in some detail to give you a sense of the scope of the lessons and assignments. The remaining four I will describe more briefly.

The first paper focuses on the skill of distinguishing facts from opinions. The lesson begins with a definition of fact as something that has actually happened, is true, or can be proven to the satisfaction of reasonable people. I point out that in political science, as in much of life, some facts are not easily proven, such as our conviction that democracy is the best form of government. I then distinguish opinions from facts by indicating that opinions are interpretations of facts or historical events about which there is no agreement.

There follows an explanation of the steps the reader can take to clarify the nature of the facts and opinions found in an article. With regard to facts, the students learn how to:

1. Distinguish between facts that are central to the author's argument and facts that are incidental to the argument.

2. Distinguish between facts that are common knowledge and facts that are not (and therefore need to be proven).

3. Distinguish facts from opinions that are disguised as facts.

With regard to opinions, the students learn how to:

1. Distinguish between opinions that are central to the author's argument and opinions that are incidental.

2. Distinguish between opinions that require justification and those that do not.

3. Distinguish between opinions the author supports with evidence and those that s/he does not support.

4. Distinguish between opinions the authors acknowledges as opinions and those s/he tries to disguise as facts.

In the course of the lesson I mention several points about the conventions of the political science discipline. I explain, for example, what standards political scientists use in deciding whether or not something should be accepted as fact. I also point out that widely held "facts" (e.g. that our European allies are not carrying their share of the cost of NATO defense) are legitimately called into question and are the focus of much scholarly research. I also mention that in all disciplines intellectual honesty requires that an author clarify when he is basing his argument on a theory with which not all scholars agree.

Having completed the lesson, I then describe the assignment in detail. All of the students are to read the same article in Annual Editions: World Politics. After reading it thoroughly they are to write a brief sentence or two capsulizing the main point of the article. (At first I did not require this, but I discovered that some students had not thought to do it on their own, with the result that they were not able to do the next part of the assignment.) The students are then to quote ten facts that are key to the author's argument and five that are incidental, indicating why they think the facts are central or incidental.

Following each of the ten key facts the students are to indicate:

- whether the author attempts to prove them;
- if an attempt is made, what kind of evidence is given and how persuaded the student is by the "evidence"; and,
- if the facts are not proven, whether they are part of the student's fund of common knowledge.

Next, the students are to quote ten opinions expressed by the author. Following each they are to indicate:

- whether it is a key or incidental opinion, and why
- whether the author acknowledges it to be an opinon or instead hides it by asserting it as a fact; and,
- whether the author supports his opinion, and if he does, indicating the type of support and whether the student finds it persuasive, and why.

The first paper, then, turns out to be a list of quotations, followed by words or phrases describing the nature of the quoted material. A typical entry may look like this:

> "In his Inaugural Addess, John Kennedy committed the U.S. to resist communism at all cost." This is a key opinion because...; it is not acknowled but it is supported with reference to another source (book by Arthur Schlessinger Jr.); I'm not convinced because...

The assignment concludes with the criteria I will use in grading their work. In this instance I indicate that this is the first in a series of papers designed to help them develop their critical thinking skills and that I do not expect them to perfect the skills in their first effort. I call their attention to the fact that it is especially difficult for neophytes to determine that something forcefully stated as a fact may in reality be an opinion and I ask them to be on the lookout for examples of this. I then indicate that their grade will reflect my overall sense of how well they do at distinguishing facts from opinions and that it will not be based on a mathematical formula related to how many "right" or "wrong" judgments they make. I don't tell them, but in fact I tend to give only A's, B's, and C's on the first paper, with the C reserved for those who don't seem to have taken the assignment very seriously.

The second assignment deals with the skill of determining the author's point of view, which I define as the opinion, outlook, attitude, or prejudice we have toward things we encounter in our daily lives. I indicate that one's point of view can grow out of extensive study and research, or, at the other extreme, it can result from a variety of past experiences which reside in the subconscious.

Without defining them, I call their attention to some of the more obvious points of view which could be found in any kind of writing, such as that an author can be sympathetic/unsympathetic, tolerant/intolerant, and/or cynical/trusting. I then spend several pages explaining the liberal and conservative points of view since they will regularly encounter these in political writings. The lesson ends with a discussion of the final point of view to be considered, that of the student himself. I stress the fact that if the student's point of view is similar to that of the author he may unthinkingly accept whatever is said, just as he might offhandedly reject things that reflect an opposing point of view, and that in either case the student would not be thinking for himself.

As part of my effort to orient the students to the discipline, I discuss in this lesson how different points of view can evolve into schools of thought and how the competition between these schools leads to advancements in research and knowledge.

As for the assignment, the students are required to read a given article and then:

- summarize the issue or main idea the author is writing about;
- indicate the author's principle point of view or position on this issue;
- explain the reasons given by the author for why s/he holds that point of view;
- make a judgment as to whether the author is a conservative or liberal, supporting that judgment with material from the text; and finally
- make a judgment about the extent to which the author's liberalism or conservatism interferres with his objectivity.

The third paper is concerned with detecting fallacies. In this instance the assignment comes first: the students are to read whatever articles in Annual Editions interest them. While doing so, they are to look for fallacies, defined as arguments that are unsound because they rely on flawed reasoning or faulty thinking. In their papers they are to quote fifteen fallacies, explaining why they consider them examples of faulty reasoning.

The rest of the lesson is an explanation of some of the more common fallacies: labeling, hasty generalization, appeal to authority, bandwagon, cardstacking, begging the question, false dilemma, false analogy, non-sequitur, unproven assumptions, special pleading, repitition, and misleading statistics. Unfortunately, each of these is all too easily illustrated in the area of political science, especially in the campaign speeches of politicians.

In the fourth assignment the students are required to select an article from Annual Editions, find another article that takes a different position on the same issue, and compare and contrast the two. Part of the lesson involves distinguishing among the different types of magazines (e.g. Reader's Digest, Time, the New Republic, and Foreign Affairs), indicating which are appropriate - or inappropriate - for what uses. In the process I discuss the issue of "audience" and how it affects mode of presentation. I also give some practical advice on how they can find an article in the library that takes a different position from the one they have chosen. I conclude the lesson with several alternative approaches the students can take to writing a comparison and constrast paper. I ask them to conclude their paper by giving a personal assessment of what they now believe about the issue based on the two articles, and why.

In the context of this lesson I try to help the students understand the difference between scholarly and popular periodicals, as well as the role of scholarly journals in the development of ideas within the discipline. I also take the opportunity to discuss William Perry's idea of "commitment within relativism," telling the students that "judgments must be made, but tentatively, and always open to revision based on the discovery of new information."

The final paper, entitled "Critical Assessment," asks the students to use all of the skills learned in the previous papers, as well as what they have learned from the course in general, to analyze and evaluate an assigned article. The lesson discusses in general how the student should proceed. I then describe the steps I went through in critically assessing an article I had assigned to them on the first day of class. At that time they were simply told to "read this article and write a two page critical assessment." Almost invariably they had gone off and done so without asking what I ment by that. I now return them to the students, along with a copy of my critical assessment of the article. This, along with the description in the lesson of how I went about it, gives the students a sense of how they should proceed. (Getting the paper back at this point also helps them get a sense of how far they have progressed since the semester began).

Having given you a sense of what the lessons and assignments are all about, let me conclude with three comments. Although the students tend to grumble about the amount of work, they freely admit how much they get out of it. I never had a student tell me that when I simply said "Go out an write a research paper." In addition, I am much more comfortable than I ever have been when grading the papers. Because I spent so much time clarifying the assignments for myself and then for the students, I feel confident that they have a clear sense of what is expected of them. But even more, I have a clear sense of what I am looking for when I grade the papers. And finally, I feel I have discovered a way to both cover the material of my course as well as teach skills that can make a difference in the lives of my students, skills which empower them to think for themselves when confronted with experts and politicians who forcefully express their views as fact.

GUIDED DESIGN AS A THINK TANK STRATEGY FOR TEACHING COURSE CONTENT

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INTRODUCTION

The process of decision-making has been well explained as a procedure to solve open-ended problems. In Professional Decision-Making by Wales, Nardi and Stager four operations of decision-making, namely, State the Goal, Generate Ideas, Prepare a Plan, and Take Action, are explained in detail with meaningful examples. In each of these operations three modes of thinking (analysis, synthesis, and evaluation) are followed while progressing toward a best possible solution. The questions "Who is involved?; What is involved?; What happened?; When did it happen?;" and, "How serious was it?" help to define the situation and identify the problem to be solved.

To use this process as a tool for teaching course content requires commitment to the preparation of units of subject matter so that facts, assumptions, and opinions can be organized for group discussion. In so doing both subject matter and thinking skills can be learned and put to use.

The purpose of this paper is to demonstrate how course content can be adapted so that thinking skills are included in the learning experience. A unit of study from theatre history is used as a basis for examinining how subject matter can be structured with learning objectives, study guide, a hypothetical problem situation, instructions and feedbacks. The process follows a Guided Design procedure for solving an open-ended problem using student groups as "think tanks" for decision-making. The Guided Design structure allows students to acquire knowledge of Greek theatre while applying thinking skills.

The example used here is taken from a course in theatre history but the method used is typical of decision-making procedures which can apply to other academic disciplines. Decision-making is not limited to the natural sciences and this example shows how it can apply to a course in the humanities. The title of the problem is "What's Funny." It was published in its complete form by the University Press of America along with other Guided Design problems in Think Tank Theatre, 1984. This problem was used for a unit study in ancient Greek comedy using Aristophanes' play The Clouds as the primary source.

Basically, the procedure to be followed breaks down into seven parts. These parts might also apply to units of study in other disciplines such as literature, history, music, art, classics or other humanities subjects. The seven parts to be considered here are: Learning Objectives, Study Guide, Hypothetical Problem Situation, Instructions and Feedbacks, Narrowing Down and Noticing Techniques, Application of Principles, and Evaluation.

LEARNING OBJECTIVES

One reason why students flounder in the midst of reading assignments, lectures, and discussions is that information, though abundant, is not put to use. It is assumed that facts, assumptions, and opinions will be assimilated and that this will constitute the learning experience. However, if the information cannot be made relevant it is of little value.

Learning objectives guide the selection of materials and procedures to be used in the classroom instruction. Davis, Alexander, and Yelon, in Learning Stystem Design, define a learning objective as "a description of the behavior expected of a learner after instruction." What is the student expected to be able to do once the unit of study has been completed? In our example in which students are to study ancient Greek comedy the learning objectives are stated as follows:

1. To explain the origin and basic nature of ancient comedy.
2. To understand selected principles of verbal and visual humor from Aristophanes.
3. To identify selected techniques for acting a comic role.
4. To compare ancient comedy to contemporary comedy.

Of these four, number one, three, and four can be tested because they imply an action which students should be able to perform. The second objective "to understand" is more ambiguous and suggests a state of mind rather than a behavior. To incorporate action into the objective one might change the word "understand" to "select" principles of humor and apply them to a specific example from Aristophanes' play. This would then be an action which could be tested once the problem has been completed.

STUDY GUIDE

The study guide is a way of providing students with common sources of content material. The sources should be attainable and readily available so that study outside the classroom becomes a very real investigation of sources other than the textook. It helps to motivate the gathering of information which will be used in the classroom. It is a way, also, of indicating that there are both primary and secondary sources and some of them may be audio and visual in addition to the usual printed word.

The study guide for "What's Funny" includes a classical play The Clouds by Aristophanes as the primary source, three essays (secondary sources) about the nature of Greek comedy, a commercially recorded lecture about this play presented by Kenneth Cavender, an academic authority on the subject, and a suggested reference to an historical source which includes many photographs of ancient statues, masks, and paintings which provide visual information about the ancient comedic traditions.

HYPOTHETICAL PROBLEM SITUATION

This step in adapting content material to the decision-making process is a crucial one, and perhaps the most difficult one to construct. The problem should be open-ended. It should be a problem that requires a search for information, has alternative possibilities, and one that has no simple right or wrong answers.

In the case of "What's Funny" it was decided that the problem should be one the students could identify with easily because the play to be studied is remote from their experience in literature as well as theatre. It assumes that there is a Greek Club on campus which has decided to celebrate an ancient tradition by performing one of Aristophanes' plays, The Clouds, as part of an annual festival. A fictional character, Telly Kepros, is introduced. He is a new initiate to the Club. He has been cast in the role of the son, Pheidippides. Telly knows little about acting or about Greek Comedy so the problem becomes his problem. He must find out what is funny about Greek comedy and what techniques might be applied to his own performance. He does this by investigating and analyzing the play, the essays and other resource material. And he consults a "semi-retired" professional actor who gives his point of view and advice.

The students of theatre history, then, identify with Telly Kepros and, in groups of five to seven, they collectively proceed with the series of instructions and feedbacks. With a little imagination it is possible to invent hypothetical situations which require group discussion and decision-making to enhance investigation and analysis of drama, literature, case studies in law, historical information, social or political problems,musical or artistic compositions, foreign language problems, and other concerns in the humanities.

INSTRUCTIONS AND FEEDBACKS

The instructions and feedbacks provide the guidelines for solving the problem. They follow the decision-making steps although the sequence may vary depending on the nature of the problem. Student groups respond to an instruction before they read a professional feedback. In this way they do their own thinking and are provided a comparison with a professional point of view.

Steps followed in this problem were as follows:

INSTRUCTION A - State the Problem.

FEEDBACK A - State the Problem: Telly's problem is, "What approach should I take to enable me to interpret and perform the role from this ancient comedy to the best of my ability?"

INSTRUCTION B - Establish Objectives.

FEEDBACK B - Objectives.

1. To explain the origin and basic nature of ancient comedy.
2. To be able to state selected principles of verbal and visual humor.
3. To identify selected techniques for acting in a comic role.

INSTRUCTION C - Gather Information, the Storyline.

FEEDBACK C - Summary of the Story.

INSTRUCTION D - Analyze Humor, Visual and Verbal.

FEEDBACK D - Examples of Visual and Verbal Humor from the Play.

INSTRUCTION E - Gather Information, Principles of Humor.

FEEDBACK E - Principles of Humor from the Essays.

INSTRUCTION F - Gather Information, Personal Experiences of What is Funny.

FEEDBACK F - Examples of Humor from Everyday Experiences.

INSTRUCTION G - Generate Possible Solutions, Acting Style, Voice, Action, Characterization, Costumes.

FEEDBACK G - Possible Solutions for Acting Style from Telly's Research and Interview with Professional Actor.

INSTRUCTION H - Evaluate the Solution.

FEEDBACK H - Evaluation. The Advice Obtained is Feasible, Practical, Safe, Economical, Moral.

NARROWING DOWN AND NOTICING TECHNIQUES

Some of the above instructions and feedbacks provide what D.N. Perkins in The Mind's Best Work calls "narrowing down" and "noticing techniques." The hypothetical problem, itself, is a way of narrowing down the study of a body of material. Adapting material to be used for a decision-making process is creative activity and it is refreshing to make problems the center of thinking in order to devise the scheme of instructions and feedbacks. Problem finding becomes the task of the instructor. It helps provide focus for the learning objectives and the path of problem solving for students.

The story is summarized in Feedback C to tie individual scenes together and give the play a through-line. The imaginary professional actor relates the story after the students have made their own attempt to follow the main characters from the initial scene to the conclusion. In the opening scene it is revealed that the son, Pheidippides, is squandering his father's money by betting on the horses. The father, Strepsiades, claims that his wife has spoiled the boy and now a "galloping consumption" has caught up to the family fortunes leaving the "old man" in debt. To solve this problem Strepsiades attempts to send the son to a school where "Worse Logic" is taught. This is the kind of study that allows students to learn how to talk their way out of anything and thereby become successful. The plan does not succeed because the son refuses to give up his penchant for gambling, so the father decides to enter school himself. This is where he confronts Socrates in a ridiculous classroom situation and though bewildered he is willing to take Socrates' advice no matter how absurd it may seem. The story is interrupted by a long discourse in which Aristophanes boasts of the high quality of his plays compared to other playwrights and on the bumbling ways of Athenians. There is a debate between two characters named Right Logic and Wrong Logic in which the latter declares himself the winner. When the son finally is persuaded to go to this school he successfully completes the course in Wrong Logic and as a result gives his father a beating as revenge for all the beatings he took as a child. Strepsiades sets fire to the school. A chorus of Clouds which has been commenting on events along the way finally compliments itself for being such a fair judge of the situation.

Perkins, in a chapter entitled "Ways of the Mind," demonstrates how "visual search" and "noticing" function in creative thinking. In the analysis of visual and verbal humor in The Clouds students probably would not notice examples unless given the target. But once they know what to look for after reading the play they can scan with considerable efficiency to find examples in the text. Narrowing down and noticing help to establish a pattern of recognition. Examples of visual humor include a female chorus of Clouds acted by males in masks, Socrates suspended in a basket over his students, a prime student who looks "half-dead," exaggerated physical features in the costumes and masks of the main actors, farcical beatings and other physical manifestations having to do with fertility rites. Verbal humor can be found in puns or ludicrous comparisons. Strepsiades says "...that Heaven is one vast fire-extinguisher Placed round about us, and that we're the cinders." Socrates in his teaching compares thunder to bowel rumblings. Stepsiades mistakes the statement of Socrates that there is only a vortex of winds on top of Mount Olympus, not Zeus, to mean that Vortex is the name of a new god who has ousted Zeus.

APPLICATION OF PRINCIPLES

Davis, Alexander, and Yelon distinguish principles from concepts. In the structure of knowledge, concepts are combined into principles, but a principle is not simply a number of concepts linked in the same sentence. "A principle states a relationship between classes of events which enable us to: (1) predict consequences; (2) explain events; (3) infer causes; (4) control situations; and (5) solve problems." (Davis, Alexander, Yelon, p. 231). Very often students lack practice in recognizing stated principles as well as experience in applying them to hypothetical or real life situations. In "What's Funny" they are required to pick out principles of humor from the assigned essays. Then they are asked to apply them to examples of humor in the play and also to examples of humor from their own life experiences.

For example, in "The Comic View" by Barnet, Berman and Burto, a principle states, "Comedy is thus frequently critical of the individual; it accepts as valid the codes of society, and is amused to see individuals set themselves up as exceptional." In The Clouds Aristophanes ridicules Socrates, the great teacher, by suspending him in a basket while he watches over a school full of scrawny, grovelling students.

EVALUATION

At the conclusion of this hypothetical problem students who have followed the decision-making process know what the Greeks considered to be funny in The Clouds; they know what they consider to be funny in their own lives; they are aware of the origins of Greek comedy; and they have discovered certain techniques for comedic acting. The four operations outlined by Wales, Nardi, and Stager in Professional Decision-Making have been followed. Namely, a goal statement was made, ideas were generated, a plan was prepared, and action was taken. The modes of thinking - analysis, synthesis, and evaluation have taken place although probably not in the tightly ordered way recommended by these authors. The evaluation step in "What's Funny" asks students to reflect on their work and decide to what extent their research and recommendations resulted in a solution that was feasible, economical, safe, practical, and moral.

Adapting the subject of Greek comedy to the decision-making process provided a way for students to identify with the historical context, to make the principles involved relevant to their own lives, and a way to experience thinking skills while researching and discussing aspects of ancient Greek comedy.

REFERENCES

1. Eight Great Comedies, Edited by Sylvan Barnet, Morton Berman, William Burto, A Mentor Book, The New American Library, New York and Toronto, 1958.
2. Learning System Design, Robert H. Davis, Lawrence T. Alexander, and Stephen L. Yelon, McGraw-Hill Book Company, New York, 1974.
3. Professional Decision-Making, Charles E. Wales, Anne H. Nardi, and Robert A. Stager, Center for Guided Design, West Virginia University, Morgantown, West Virginia, 1986.
4. The Mind's Best Work, D.N. Perkins, Harvard University Press, Cambridge, Massachusetts, 1981.
5. Think Tank Theatre, Donald A. Borchardt, University Press of America, Lanham, Maryland, 1984.

"FROM FAMILY TREES TO DECISION TREES"

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Presented at the Fifteenth Annual Conference of the
International Society for Individualized Instruction

A Society for Exploring Teaching Alternatives

October 9-11, 1986
Ramada Renaissance Hotel
Atlanta, Georgia

Acknowledgments

1 - Figures from Moshe F. Rubinstein, TOOLS FOR THINKING AND PROBLEM SOLVING, 1986. pp, 180-181, 285. Reprinted by permission of Prentice-Hall, Inc., Englewood Cliffs, New Jersey. (Letter August 5, 1986).

2 - Figures from Thomas L. Saaty, DECISION MAKING FOR LEADERS, 1982. Wadsworth, Belmont, California. Permission granted by Van Nostrand Reinhold Company, Inc., 115 Fifth Avenue, New York, New York. (Letter August 19, 1986).

3 - Figures from Robert T. Francoeur, BIOMEDICAL ETHICS: A GUIDE TO DECISION MAKING, 1983, John Wiley and Sons, Inc., Reprinted by permission of John Wiley & Sons, Inc. (Letter Dec. 16, 1985).

4 - Appreciation is extended to Dr. Samuel Goldberg, Sloan Foundation, for introducing me to Thomas L. Saaty's books.

OUTLINE

- Introduction (5 minute overview)

  Cartoon - soup tasting decision

- HIERARCHICAL CONCEPTS
  - Human Hierarchy
  - Personal Achievement
- SAATY'S ANALYTICAL HIERARCHY PROCESS
  - Hierarchy for Choosing a School
  - Pairwise Comparison Scale
  - Choosing from Three Jobs
- TREE STRUCTURES
  - Family Tree - Genealogy of Psychology
  - Simple Probability Tree
  - Worth Trees
    - Worth Value of a Home
    - Calculation Table
    - Saaty's Hierarchy for Purchasing a House
  - Relevance Trees
    - Rubinstein's "Best Job"
    - Trobian's "Best Auto"
    - Rubinstein's Nine Steps
- DECISION TREE METHODOLOGY
  (in an Introduction to Ethics course)
  - Francoeur's invalid Widow - Tree #1
  - Probabilities and Calculations
  - Tree #2, Tree #3
- RESEARCH EXAMPLES OF TREE STRUCTURES
  - Different Types of Additive Trees
  - Huffman Tree Construction Algorithm
  - Social Work Agency - Partial Value Assessment
  - Preference Trees
  - Similarity: 1) Animals, 2) Letters, 3) Occupations
  - 48 English Nouns: Table/Tree Graphs of Cluster Analysis
  - Political Tree - Voting Behavior
  - AID Tree for Retail Store Visitation
  - AID Tree - Correlates of Readership
  - Classification Binary Tree - Biology Field Work
  - Manuscript Linkage Problem
  - Braverman's Timed multi-stage Decision Tree
  - Mountain Pass Transportation Decision Tree

  Cartoon - statistical beast

ISII Conference
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"FROM FAMILY TREES TO DECISION TREES"

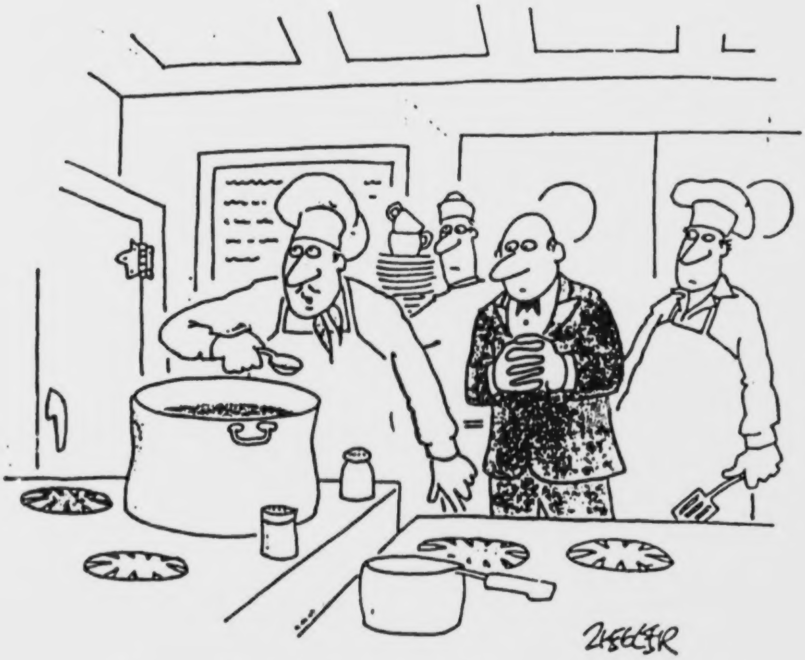
INTRODUCTION

Since the theme of this conference is "Thinking Across the Disciplines," and the ISII is "A Society for Exploring Teaching Alternatives," I reflected on certain concepts and techniques that appear relevant to several disciplines. In addition, because Bennett College is a women's college, we have become increasingly concerned with encouraging interest in quantitative reasoning, and we are successfully alleviating the old stereotype that women "can't do math, think logically, or make decisions by themselves."

This paper is a preliminary inquiry by a non-mathematician into graphic methods of sequential planning and ways that hierarchical analyses and tree structures can be helpful in developing interest in the use of mathematical modeling in the search for creative solutions to real-life problems.

There are decision problems (especially in humanities and social sciences) in which both qualitative and quantitative aspects are combined as judgment and prior experience lead to examination of alternative consequences of the action to be taken. Also, the increased use of personal computers in colleges and the need for computer literacy reflects that "tree methodology is a child of the computer age" (Brieman, et al, viii).

I will look briefly at hierarchical concepts, probability, and several types of tree structures prior to describing decision tree methodology that was used in a class last semester. As an appendix, a variety of examples of tree structures that have been used to facilitate research in several disciplines can be shown. It is hoped that this effort will stimulate thought about ways to encourage "quantitative literacy."



"Mmm. The soup du jour is not cream of mushroom. It is not tomato or celery. It is not chicken, nor is it Scotch broth. It is most definitely not won ton..."

Drawing by Ziegler; © 1980 The New Yorker Magazine, Inc.

HIERARCHICAL CONCEPTS

It is generally agreed that hierarchical ordering is basic to human thought. Think of the hierarchical classification of:

- numbers, scales, times, positions, crystal forms, symmetry elements, and groups;
- symbolisms, sentences, and languages of all kinds;
- logical types, concepts, principles, information, quantities, and abstractions of many other sorts. (White 9)

The idea of hierarchy includes various controversies. The word is derived from the Greek hieros (sacred) and archos (ruler). Most references attribute the word to Dionysius the Areopagite, a fourth century disciple of St. Paul who is said to have written a book entitled De Coelesti Hierarchia. (For biblical reference see the book of "Acts" in the New Testament, Chapter 17, verses 32-34). He is referred to by Dante in Canto X and Canto XXVIII of The Divine Comedy as having seen several heavenly orders of angelic and priestly choirs (Bk. 20, p. 406 and notes 3 and 5 in Harvard Classics edition). Plato treats hierarchical concepts in his Dialogues and Aristotle was concerned with hierarchical structures in nature. Conjectures about spatial and abstract hierarchies continue throughout the history of ideas, and appear today in histories of General Systems Theory and in the literature of all disciplines studying complex situations. (See Klir, 21-24) The history of this idea links science and religion, literature and philosophy, mathematics and other disciplines.

The human hierarchy, as described by various persons, moves from the physiological, through the psychological to the sociological, (Milsum 154),

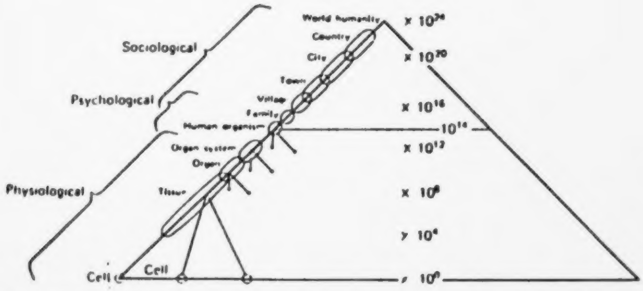


Figure 5.1. The human hierarchy. The multiple subsystems at any level are suggested by the several radiating lines. The variation in size at any level is suggested by the length of the link.

The human development stages of Erickson, Graves and Maslow have been combined in a "hierarchy of personal achievement" (Milsum 153).

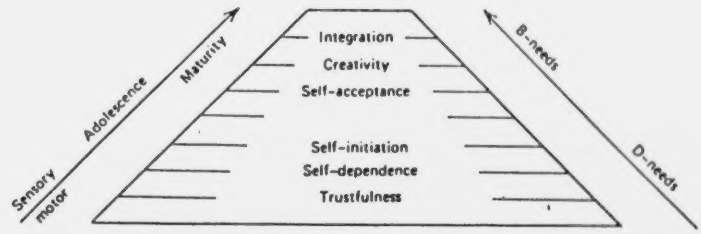

Integration
Creativity
Self-acceptance
Self-initiation
Self-dependence
Trustfulness
Sensory motor
Adolescence
Maturity
B-needs
D-needs

Figure 5.4. Stages of psychophysiological development in man—inferred from Erikson [14], Graves [13], and Maslow [12].

Thomas L. Saaty describes applications of the Analytic Hierarchy Process ranging from personal decisions to high level corporate and governmental conflict resolutions. He feels that this method combines the deductive approach to problem solving with the systems approach, establishes priorities and puts into an "integrated, logical framework" a focus on the parts along with the workings of the whole (2). A series of hierarchies given by Saaty in Decisions for Leaders illustrate ways to break down problems or objectives into separate elements or levels, how to rank the elements by relative importance, and how to ensure some degree of logical consistency. In this hierarchy for choosing a school thesix criteria: educational, vocational, sports, cultural, social and spiritual are given a series of subcriteria and each school is then prioritized with respect to those subcriteria (34).

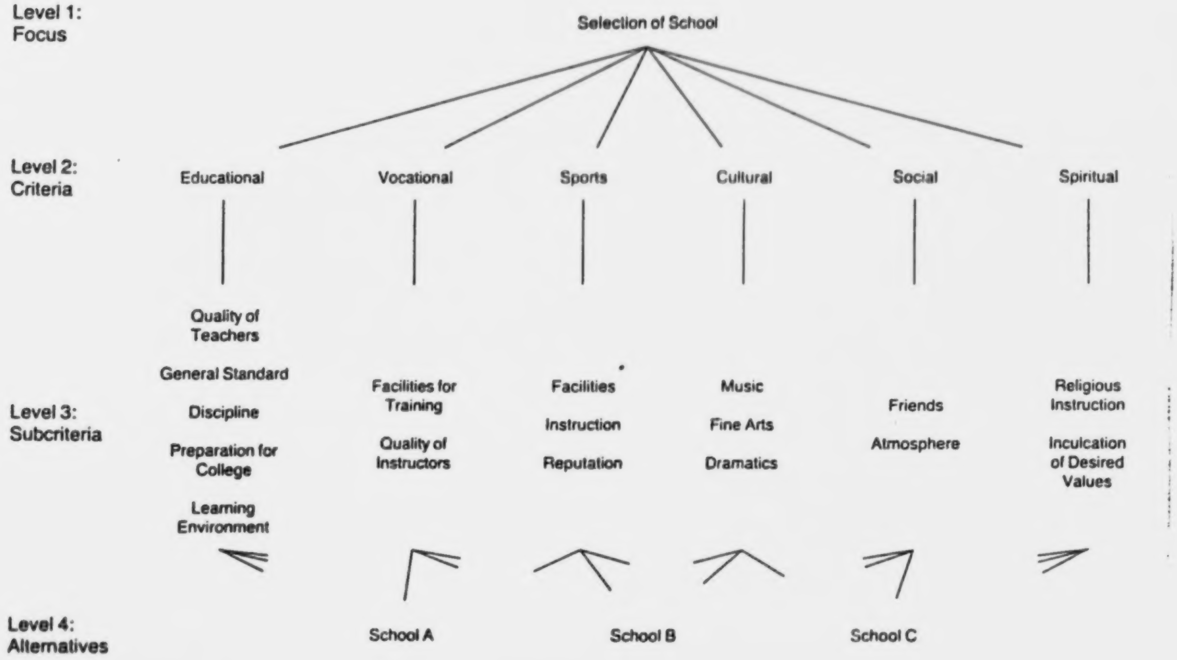

Level 1: Focus
Selection of School
Level 2: Criteria
Educational
Vocational
Sports
Cultural
Social
Spiritual
Level 3: Subcriteria
Quality of Teachers
General Standard
Discipline
Preparation for College
Learning Environment
Facilities for Training
Quality of Instructors
Facilities
Instruction
Reputation
Music
Fine Arts
Dramatics
Friends
Atmosphere
Religious Instruction
Inculcation of Desired Values
Level 4: Alternatives
School A
School B
School C

Figure 4-16 Hierarchy for Choosing a School

A method for quantifying relative values by creating a matrix of relative weights is described by Saaty. A pairwise comparison scale provides a matrix for calculation (Saaty and Alexander 148).

Table 5-1 The Pairwise Comparison Scale

Intensity of Importance	*Definition*	*Explanation*
1	Equal importance of both elements	Two elements contribute equally to the property
3	Weak importance of one element over another	Experience and judgment slightly favor one element over another
5	Essential or strong importance of one element over another	Experience and judgment strongly favor one element over another
7	Demonstrated importance of one element over another	An element is strongly favored and its dominance is demonstrated in practice
9	Absolute importance of one element over another	The evidence favoring one element over another is of the highest possible order of affirmation
2, 4, 6, 8	Intermediate values between two adjacent judgments	Compromise is needed between two judgments
Reciprocals	If activity *i* has one of the preceding numbers assigned to it when compared with activity *j*, then *j* has the reciprocal value when compared with *i*	

As an example of a personal decision Saaty demonstrates an entire hierarchy structured by "a woman who has recently earned her Ph. D. and is being interviewed for three jobs. Which one should she choose?" . . . "each element in a level is evaluated in terms of all the elements in the next higher level." Level 1, the focus or goal, is called "Overall Job Satisfaction"; the Level 2 criteria: Research, Growth, Benefit, Colleagues, Location, Reputation are the criteria that she feels will make contributions to her job satisfaction; and Level 3 represents the three different opportunities. By using the Pairwise Comparison Scale a matrix of the criteria with respect to the focus was prepared, then six matrices for comparing the three jobs with respect to each criterion. Reputation turned out the most important for her, followed by growth and benefits. "All three entries in the vector of priorities obtained in each of the six matrices and listed in the last column of each are multiplied (weighted) by the priority of the corresponding criterion. The results of this operation are then added to yield the overall priorities for the jobs. (A=.40, B=.34, C=.26)." (Saaty 85-86) The slide shows pairwise comparisons for the six criteria and the figures that prioritized the jobs sufficiently to influence the candidate toward Job A.

TABLE 8.4

Overall satisfaction with job	Research	Growth	Benefits	Colleagues	Location	Reputation	Eigenvector
Research	1	1	1	4	1	1/2	0.18
Growth	1	1	2	4	1	1/2	0.19
Benefits	1	1/2	1	5	3	1/2	0.19
Colleagues	1/4	1/4	1/5	1	1/3	1/3	0.05
Location	1	1	1/3	3	1	1	0.12
Reputation	2	2	2	3	1	1	0.30

Now each job is compared with each of the other jobs with respect to how they bear upon each of the six criteria (Table 8.5).

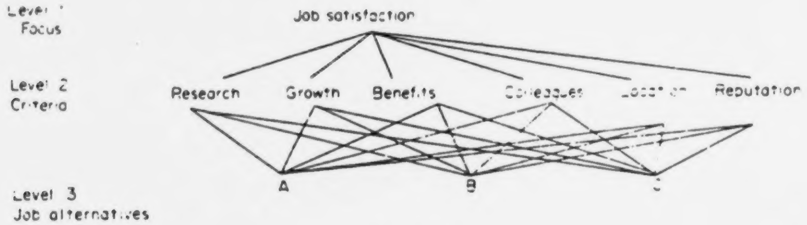

Level 1
Focus
Job satisfaction
Level 2
Criteria
Research
Growth
Benefits
Colleagues
Location
Reputation
Level 3
Job alternatives
A
B
C

FIG. 8.2.

TABLE 8.5

	Research				Growth				Benefits		
	A	*B*	*C*		*A*	*B*	*C*		*A*	*B*	*C*
A	1	1/4	1/2	*A*	1	1/4	1/5	*A*	1	3	1/3
B	4	1	3	*B*	4	1	1/2	*B*	1/3	1	1
C	2	1/3	1	*C*	5	2	1	*C*	3	1	1

	Colleagues				Location				Reputation		
	A	*B*	*C*		*A*	*B*	*C*		*A*	*B*	*C*
A	1	1/3	5	*A*	1	1	7	*A*	1	7	9
B	3	1	7	*B*	1	1	7	*B*	1/7	1	5
C	1/5	1/7	1	*C*	1/7	1/7	1	*C*	1/9	1/5	1

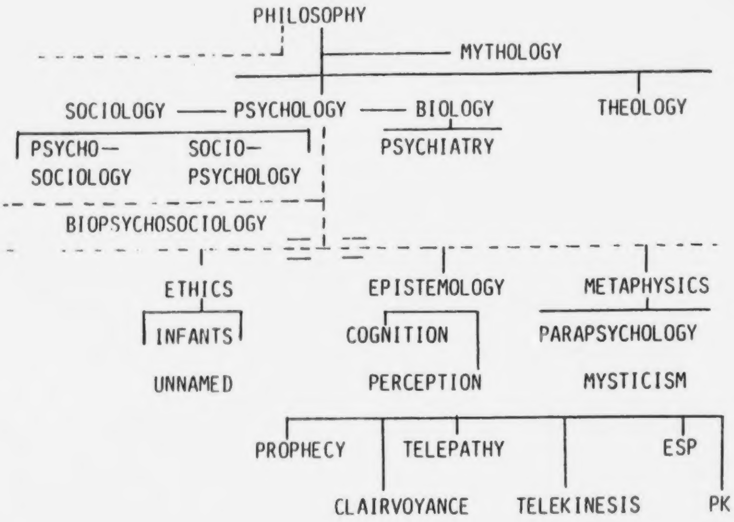
The eigenvectors (one for each criterion) just obtained are each weighted by the eigenvector component of the associated criterion and the results summed and normalized. We obtain:

$$0.16\begin{bmatrix}0.14\\0.63\\0.24\end{bmatrix}+0.19\begin{bmatrix}0.10\\0.33\\0.57\end{bmatrix}+\cdots+0.30\begin{bmatrix}0.77\\0.17\\0.05\end{bmatrix}\dashrightarrow\begin{array}{c}\begin{bmatrix}0.40\\0.34\\0.26\end{bmatrix}\end{array}\begin{array}{l}A\\B\\C\end{array}$$

We have prioritized the jobs. The differences were sufficiently large for the candidate to accept the offer to job *A*.

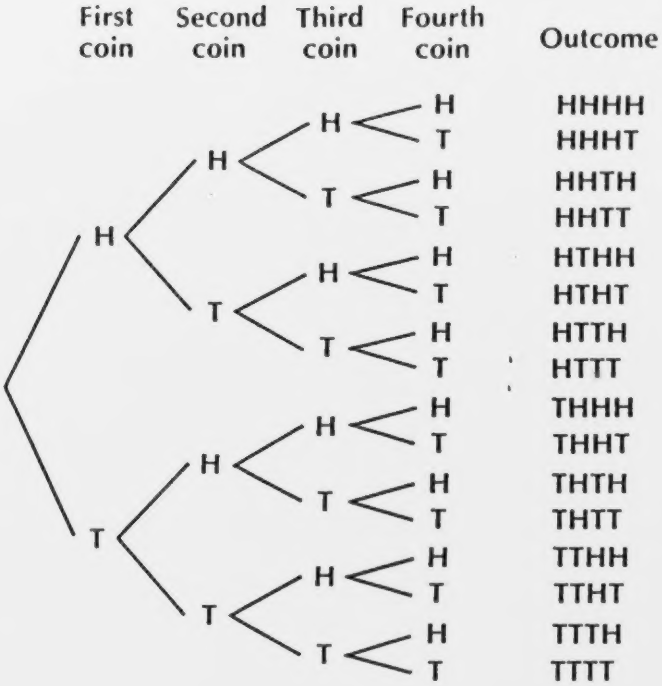
TREE STRUCTURES

Hierarchical methods are a reminder that there are also tree structure techniques for specifying and evaluating goals as well as classifying, analyzing choices, and quantifying expected outcomes. Trees are a time-honored graphic method. Map makers draw rivers and their tributaries. At an advanced age my father made detailed family trees proving that three hereditary Mennonite lines (Swiss, German and Irish) met early in the 1800s in his family. Here is a family tree for the discipline of psychology.

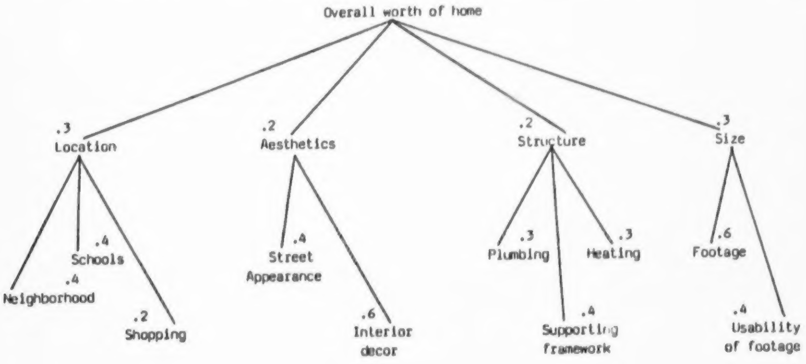

PHILOSOPHY
MYTHOLOGY
SOCIOLOGY
PSYCHOLOGY
BIOLOGY
THEOLOGY
PSYCHO-SOCIOLOGY
SOCIO-PSYCHOLOGY
PSYCHIATRY
BIOPSYCHOSOCIOLOGY
ETHICS
EPISTEMOLOGY
METAPHYSICS
INFANTS
UNNAMED
COGNITION
PERCEPTION
PARAPSYCHOLOGY
MYSTICISM
PROPHECY
TELEPATHY
ESP
CLAIRVOYANCE
TELEKINESIS
PK

THE GENEALOGY OF PSYCHOLOGY

Mathematicians construct probability trees in order to express the measurement of chances or the terms of odds. One way of showing expected outcomes is with tree diagrams such as can be made for a simple coin tossing experiment (Jacobs 344).


First coin
Second coin
Third coin
Fourth coin
Outcome
HHHH
HHHT
HHTH
HHTT
HTHH
HTHT
HTTH
HTTT
THHH
THHT
THTH
THTT
TTHH
TTHT
TTTH
TTTT

Two types of trees, useful as graphic aids to decision making are worth trees and relevance trees. Assuming an adequate source of information, a tree can serve as a preliminary model for the allocation of resources based on value judgments. Consider a worth tree for the purchase of a home. Here is a tree chart from Austin and Burns's Management Science (481-482). Imagine that you want to purchase a home and are now at the stage of deciding which one of three homes will be worth the most to you. The tree is constructed by choosing four main aspects representing overall worth of the home; location, aesthetics, structure, and size. These may be called the "higher level attributes." For each of these attributes the significant factors associated are then subsumed as "lower level attributes." A value of zero to one is assigned each attribute representing an estimate of satisfaction with the particular item being evaluated. A relative "benefit coefficient" associated with each value will also add to no more than one. This will be an intuitive estimate of the particular benefit of the item. Note that on this tree the essential factors to be considered concerning the LOCATION are the neighbord, schools, and shopping facilities. Other branches could be added. The values of all branches would add to 1, and so on for each of the attributes. Assuming that you have intuitively forecasted benefit coefficients for each of your lower level attributes (of each of the three prospective homes) you can now compute the worth value of a home.


Overall worth of home
.3 Location
.2 Aesthetics
.2 Structure
.3 Size
.4 Schools
.4 Neighborhood
.2 Shopping
.4 Street Appearance
.6 Interior decor
.3 Plumbing
.3 Heating
.4 Supporting framework
.6 Footage
.4 Usability of footage

This table shows the calculations. A worth/cost ratio is obtained by dividing the overall worth by the cost. The authors of Management Science comment that "the home purchase problem is indicative of the way in which multi-attribute utility theory is applied to multi-faceted subjects to assess their overall worth" (482).

TABLE - THREE HOMES CONSIDERED FOR PURCHASE

Attribute	Home 1	Home 2	Home 3
Neighborhood	.7	.8	.9
Schools	.6	.7	.7
Shopping	.8	.9	.3
Street appearance	.9	.6	.8
Interior decor	.5	.7	.9
Plumbing	.8	.8	.4
Supporting framework	.8	.8	.4
Heating	.7	.7	.3
Footage	.8	.9	.7
Usability of footage	.8	.9	.7
Overall calculated worth	.742	.778	.666
Asking price	$98,000	$105,000	$69,000
Overall worth/cost	.00000757	.00000741	.00000965

Using the table given here the worth value of home 1 is obtained by multiplying the worth of the lower level attributes of each branch by their respective benefit coefficients. These products are then added. Thus for home 1 we have

Location worth = .4(.7) + .4(.6) +.2(.8) = .68
Aesthetics = .4(.9) + .6(.5) = .66
Structure = .3(.8) + .4(.8) + .3(.7) = .77
Size = .6(.8) + .4(.9) = .84

Each of these calculated worths for the location, aesthetics, structure, and size are now multiplied by the comparative value assigned these factors.

Overall worth of home 1 = .3(.68)+.2(.66) + .2(.77) + .3(.84) = .742.

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Compare the worth tree with Saaty's hierarchy for purchasing a house.

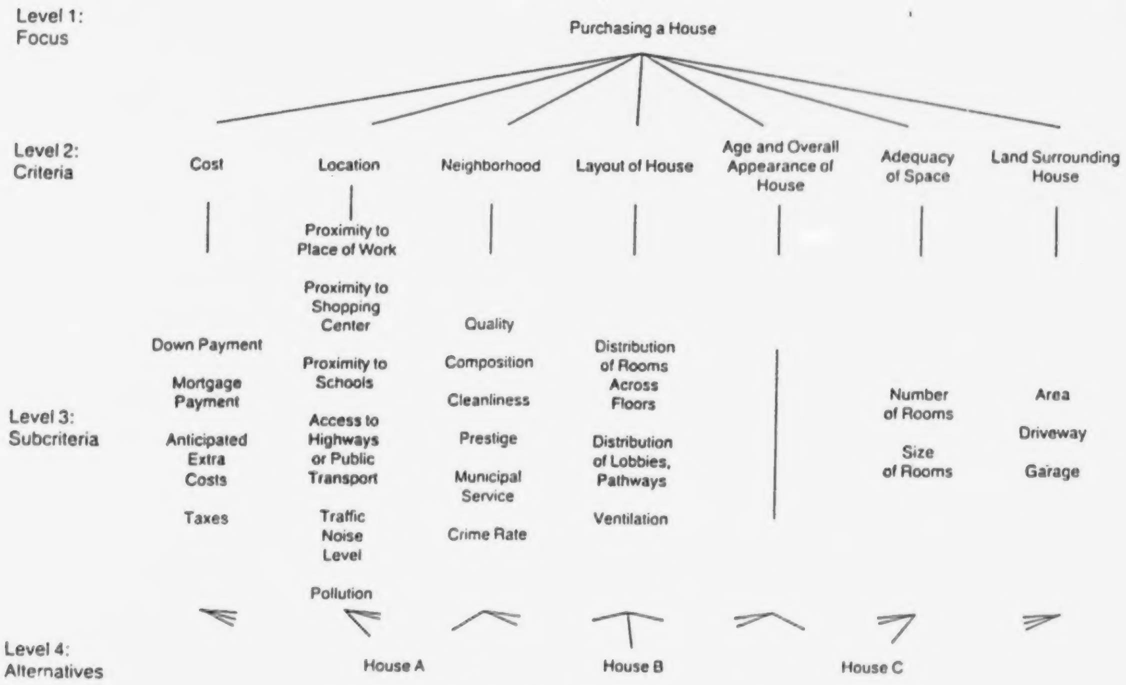

Level 1:
Focus
Purchasing a House
Level 2:
Criteria
Cost
Location
Neighborhood
Layout of House
Age and Overall Appearance of House
Adequacy of Space
Land Surrounding House
Proximity to Place of Work
Proximity to Shopping Center
Proximity to Schools
Access to Highways or Public Transport
Traffic Noise Level
Pollution
Level 3:
Subcriteria
Down Payment
Mortgage Payment
Anticipated Extra Costs
Taxes
Quality
Composition
Cleanliness
Prestige
Municipal Service
Crime Rate
Distribution of Rooms Across Floors
Distribution of Lobbies, Pathways
Ventilation
Number of Rooms
Size of Rooms
Area
Driveway
Garage
Level 4:
Alternatives
House A
House B
House C

Figure 4-17 Hierarchy for Purchasing a House

Relevance trees are comparable to worth trees. Waddington describes relevance trees as "hierarchically ordered networks of objectives. . . A vertical relevance tree relates a long-term objective to the alternative actions that should be taken in order to achieve that objective" (216).

Rubinstein's discussion of relevance trees gives a precise sequence of steps by which to reflect the most accurate value judgment. Using the same basic idea seen earlier as a hierarchy for job selection note this "Best Job" tree and its calculations. Using an abbreviated version of Rubinstein's nine steps I constructed a "Best Auto" tree. Recently I bought a new car and all my figures would now be very different! Here are the nine steps (288-289).

NINE STEPS TO CONSTRUCT RELEVANCE TREES

1) Establish broad categories relevant to the problem.
2) Assign a weight to each broad category.
3) Subdivide the broad categories into more refined components.
4) Continue step 3 to a satisfactory level of refinement.
5) Calculate the ratings of importance r_j for the attributes.
6) Assign values to the contributions c_{ij} that each alternative a_i makes to attribute $j = 1, 2, ... , m$.
7) Establish reasonable upper and lower limits for each attribute.
8) Calculate the value $v(a_i) = \sum_{j=1}^{m} c_{ij} r_j$
9) Study the results of step 8 and modify your model where necessary.

(Rubinstein, 288-289)

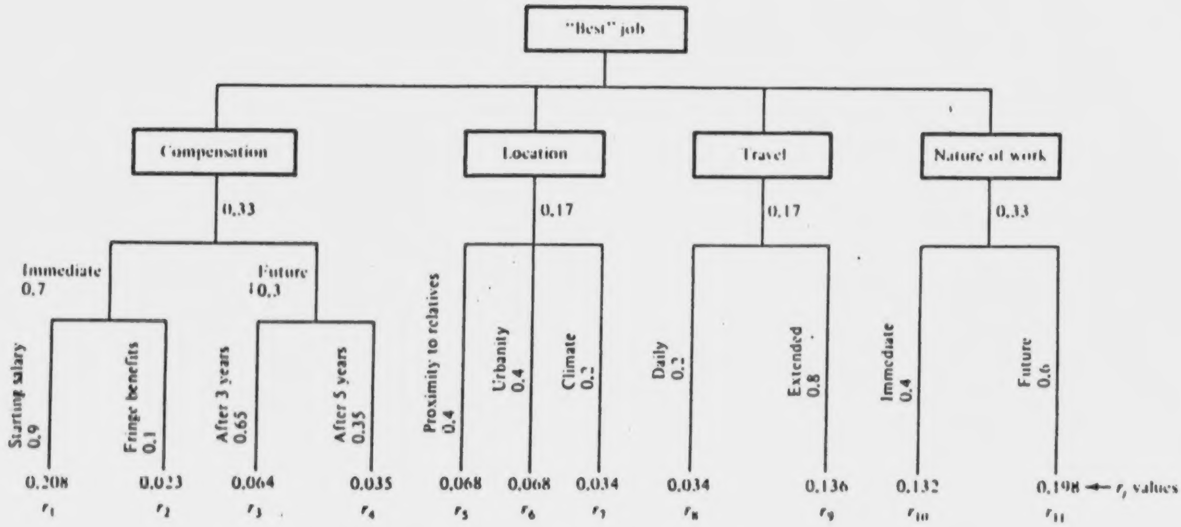
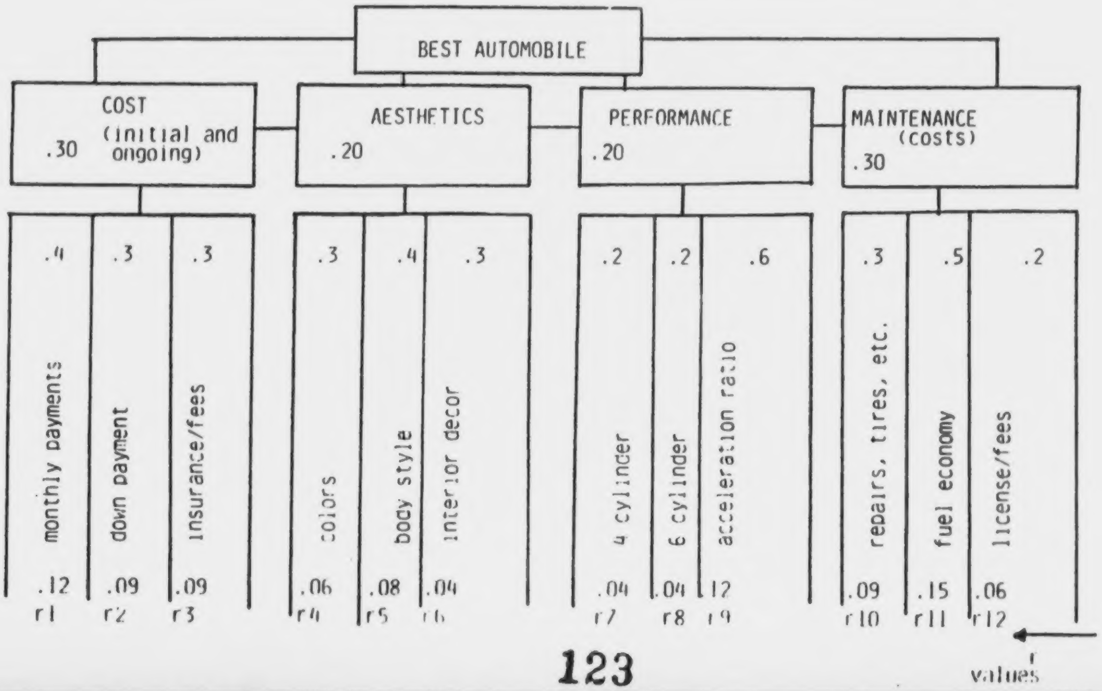

"Best" job
Compensation
Location
Travel
Nature of work
0.33
0.17
0.17
0.33
Immediate 0.7
Future 0.3
Starting salary 0.9
Fringe benefits 0.1
After 3 years 0.65
After 5 years 0.35
Proximity to relatives 0.4
Urbanity 0.4
Climate 0.2
Daily 0.2
Extended 0.8
Immediate 0.4
Future 0.6
0.208
0.023
0.064
0.035
0.068
0.068
0.034
0.034
0.136
0.132
0.198
r_j values
r_1
r_2
r_3
r_4
r_5
r_6
r_7
r_8
r_9
r_{10}
r_{11}

Figure 8.18 Relevance tree for job selection. For best job a_β^*, $c_{\beta j} = 1$ for all j, $V(a_\beta^*) = \Sigma c_{\beta j} r_j = 1$. For worst (barely acceptable) a_ω^0, $c_{\omega j} = 0$ for all j, $V(a_\omega^0) = \Sigma c_{\omega j} r_j = 0$.


BEST AUTOMOBILE
COST (initial and ongoing) .30
AESTHETICS .20
PERFORMANCE .20
MAINTENANCE (costs) .30
.4
.3
.3
.3
.4
.3
.2
.2
.6
.3
.5
.2
monthly payments
down payment
insurance/fees
colors
body style
interior decor
4 cylinder
6 cylinder
acceleration ratio
repairs, tires, etc.
fuel economy
license/fees
.12
.09
.09
.06
.08
.04
.04
.04
.12
.09
.15
.06
r1
r2
r3
r4
r5
r6
r7
r8
r9
r10
r11
r12
r values

Now for an account of the use of decision tree methodology in an Introduction to Ethics course. Following several sessions on values (including skits or simulations on abortion issues, stage theories, and ethical theories) a module on decision analysis in ethics was team taught. Dr. Ray Treadway, Professor of Mathematics, presented students with concepts of probability, expected value, and quantitative means of obtaining optimal value judgments in a biomedical situation. Students were given purchased copies of Chapter Ten "Decision Tree Technique" from Francoeur's BIOMEDICAL ETHICS: A GUIDE TO DECISION MAKING. While this was being studied Dr. Treadway assigned simple probability exercises and elementary exercises to be completed by drawing trees. (e.g., umbrella problem, a business decision, a swine-flu dilemma for decision concerning immunization).

The students were now ready for Francoeur's tree concerning an 87 year old invalid widow with a 50/50 chance of surviving an inoperable dormant tumor. "The decision is whether or not to prescribe medication to prevent a reactivation of the suspected malignant growth. The medication being considered is effective but has some side effects, which may be minor or serious" (120).

Here is the first tree. It starts with an initial decision and branches to the right. In a decision tree the choices are represented by lines on branches that emanate from a node, usually a square box. States of nature or chances are represented by circles. Together these elements describe the situation. A table is given of "Chance Events and Their Probabilities." An assumption was made that adequate medical statistics had already been done. Now these probabilities have been entered in parentheses and values of each potential outcome are shown on the far right side of the tree. The circled figures from 0 to -5 represent the extent to which serious complications may be expected.

TABLE 10.1 Chance Events and Their Probabilities

Event	Probability (%)	Event	Probability (%)
Tumor is present	50	Tumor is absent	50
Tumor reactivates	35	Tumor remains dormant	65
Medication causes side effects	90	Medication causes no side effects	10
Side effects are major	20	Side effects are minor	80

This step completes construction of our decision tree. Learning to use this diagram is our next task.

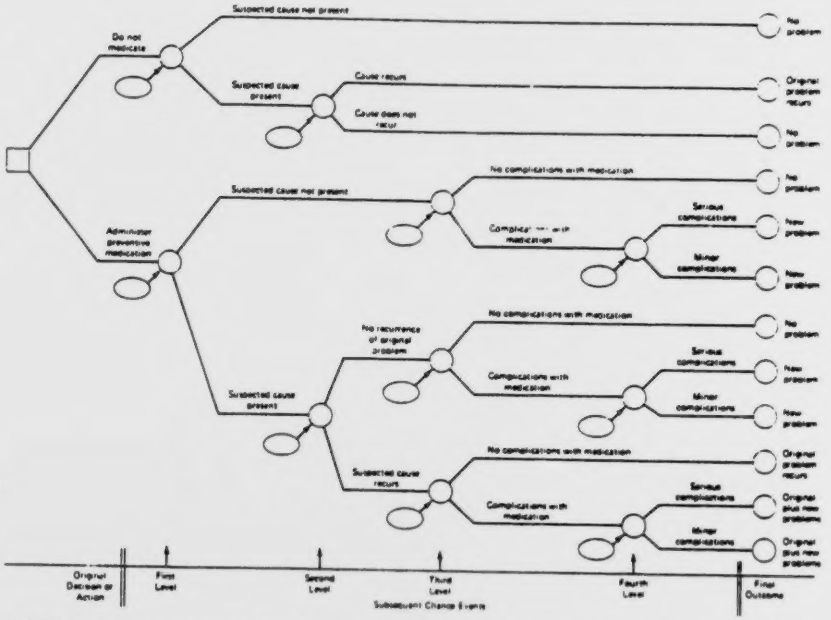

Do not medicate
Suspected cause not present
No problem
Suspected cause present
Cause recurs
Original problem recurs
Cause does not recur
No problem
Administer preventive medication
Suspected cause not present
No complications with medication
No problem
Complications with medication
Serious complications
New problem
Minor complications
New problem
Suspected cause present
No recurrence of original problem
No complications with medication
No problem
Complications with medication
Serious complications
New problem
Minor complications
New problem
Suspected cause recurs
No complications with medication
Original problem recurs
Complications with medication
Serious complications
Original plus new problems
Minor complications
Original plus new problems
Original Decision or Action
First Level
Second Level
Third Level
Fourth Level
Subsequent Chance Events
Final Outcome

FIGURE 10.1 Decision tree showing the original two decisions or actions considered, their possible or likely consequences (chance events), and final outcomes.

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The next procedure for analyzing decision trees is called "rolling back and averaging out." One must multiply the assigned value at the end of a branch by its associated probability figure and repeat to obtain other subtotals and then add subtotals together to obtain the calculated value. On this tree these figures have been entered in an ellipse with an arrow pointing to the appropriate node. Start at the far right bottom multiplying each branch in the fourth level: -4 x .8 = 3.2. Next line up: -5 x .2 = -1. "Add these two subtotals and you have the calculated value for the node leading to these two outcomes: -3.2 + -1.0 = -4.2. For the third level the process is repeated and for the final node on the first level the figures are -1.61 and -.53. So the optimal decision is the action "with the lowest first level calculated value, in this case of -.53. . . The decision is not to give the preventive medicine" (123).

Following this tree Dr. Treadway devised two assignments. The first stated conditions, the second asked students to revise the conditions. Trees were drawn, values listed, calculations made, and final results were accomplished by computer software called DECIDE.

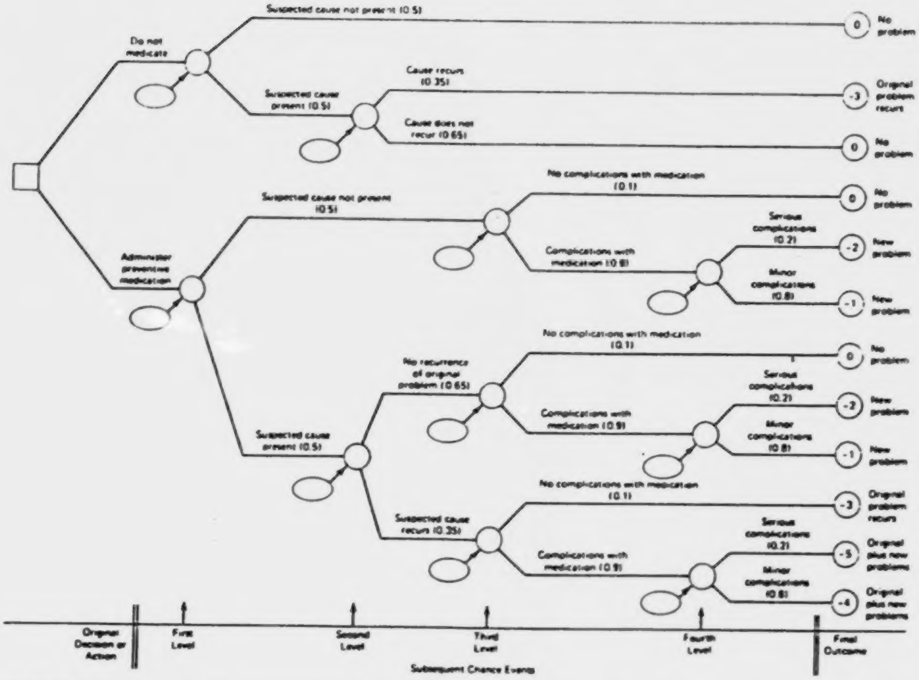
Suspected cause not present (0.5)
Do not medicate
0
No problem
Cause recurs (0.35)
Suspected cause present (0.5)
-3
Original problem recurs
Cause does not recur (0.65)
0
No problem
No complications with medication (0.1)
Suspected cause not present (0.5)
0
No problem
Serious complications (0.2)
-2
New problem
Administer preventive medication
Complications with medication (0.9)
Minor complications (0.8)
-1
New problem
No complications with medication (0.1)
0
No problem
No recurrence of original problem (0.65)
Serious complications (0.2)
-2
New problem
Complications with medication (0.9)
Minor complications (0.8)
-1
New problem
Suspected cause present (0.5)
No complications with medication (0.1)
-3
Original problem recurs
Suspected cause recurs (0.35)
Serious complications (0.2)
-5
Original plus new problems
Complications with medication (0.9)
Minor complications (0.8)
-4
Original plus new problems
Original Decision or Action
First Level
Second Level
Third Level
Fourth Level
Final Outcome
Subsequent Chance Events

FIGURE 10.2 Same decision tree shown in Figure 10.1, with assigned values listed for each final outcome on the far right and with probability estimates given in parentheses for each chance event.

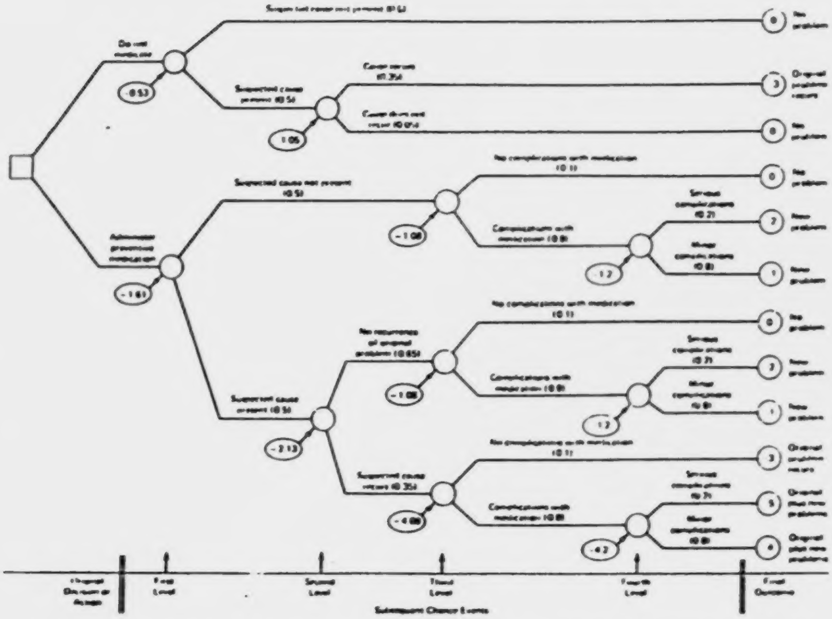
-0.53
1.05
-1.08
-1.2
-1.61
-1.08
-1.2
-2.13
-4.08
-4.2
0
3
0
0
2
1
0
2
1
3
5
4
Subsequent Chance Events

FIGURE 10.3 Completed version of Figure 10.1 decision tree. Calculated values have been worked out for each event node and entered in the oblong boxes with arrow pointing to the event node.

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FRANCOEUR

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To illustrate the use of trees in various disciplines I have selected several examples. In religious studies when the word "tree" is mentioned we tend to think of the "Tree of Knowledge," "Tree of good and evil," or the medievalists "Tree of vices." In mathematics a tree "network is one that does not have any loops" (Jacobs 470). There is even a straight line, that with a few points demarked is termed a "linear tree." Under the terminology of "additive" trees there are also ultrametric and singular and combinations. (Sattath and Tversky 340).

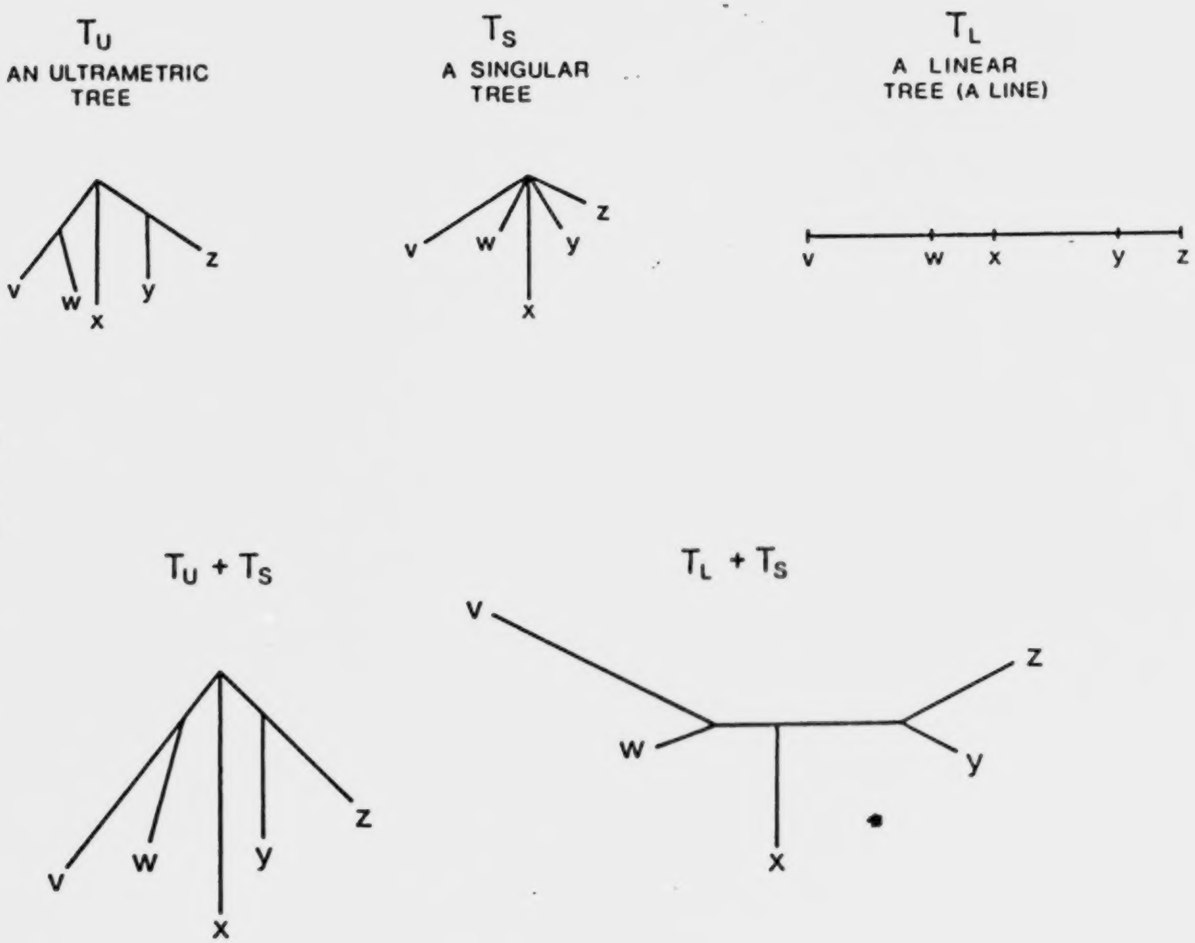
T_U
AN ULTRAMETRIC TREE
v
w
x
y
z
T_S
A SINGULAR TREE
v
w
x
y
z
T_L
A LINEAR TREE (A LINE)
v
w
x
y
z
$T_U + T_S$
v
w
x
y
z
$T_L + T_S$
v
w
x
y
z

FIGURE 13
An illustration of different types of additive trees.

Rubinstein, in Tools for Thinking and Problem Solving, under the heading of "Concepts from Information Theory" explains the "Huffman Tree Construction Algorithm." This can be used "in optimal merging of lists, construction of search trees, generating of high-quality computer codes. . . compressing of data, and even checking for leaks in a pipeline" (183).

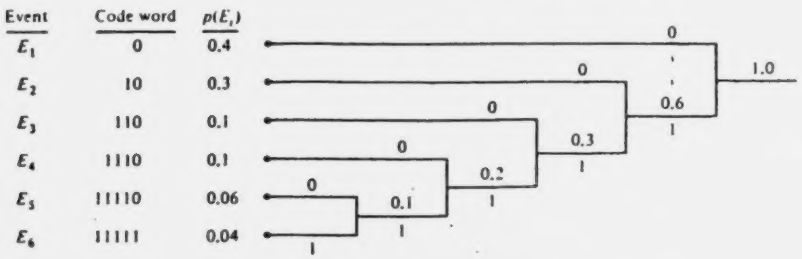
Event
Code word
$p(E_i)$
E_1 0 0.4
E_2 10 0.3
E_3 110 0.1
E_4 1110 0.1
E_5 11110 0.06
E_6 11111 0.04
0
1
0.1
0.2
0.3
0.6
1.0

Figure 5.23 Huffman tree structure for code of six events.

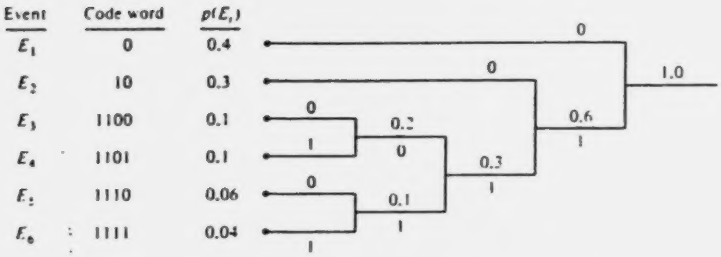
Event
Code word
$p(E_i)$
E_1 0 0.4
E_2 10 0.3
E_3 1100 0.1
E_4 1101 0.1
E_5 1110 0.06
E_6 1111 0.04
0
1
0.2
0.1
0.3
0.6
1.0

Figure 5.24 Alternative code for the events of Figure 5.23

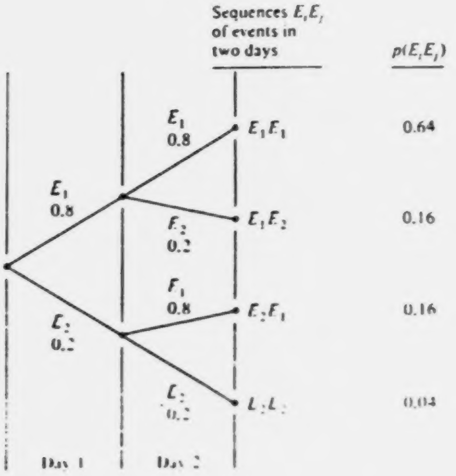
Sequences E_iE_j of events in two days
$p(E_iE_j)$
E_1 0.8
E_2 0.2
E_1E_1 0.64
E_1E_2 0.16
E_2E_1 0.16
E_2E_2 0.04
Day 1
Day 2

Figure 5.25

An example of a "partial value assessment" structure for a social work agency, shows how each goal can be given numerical value, "and the objectives that are derived from those goals can be given weights reflecting their contribution to the higher-level objectives." Drezner suggests this method as a means of "meaningful dialogue." Even with "value-laden" disagreements the program-planning process of stating goals, objectives, and priorities is improved because both communication and participation encourage "insight into the behavior of the organization" and therefore "more relevant decisions" (11).

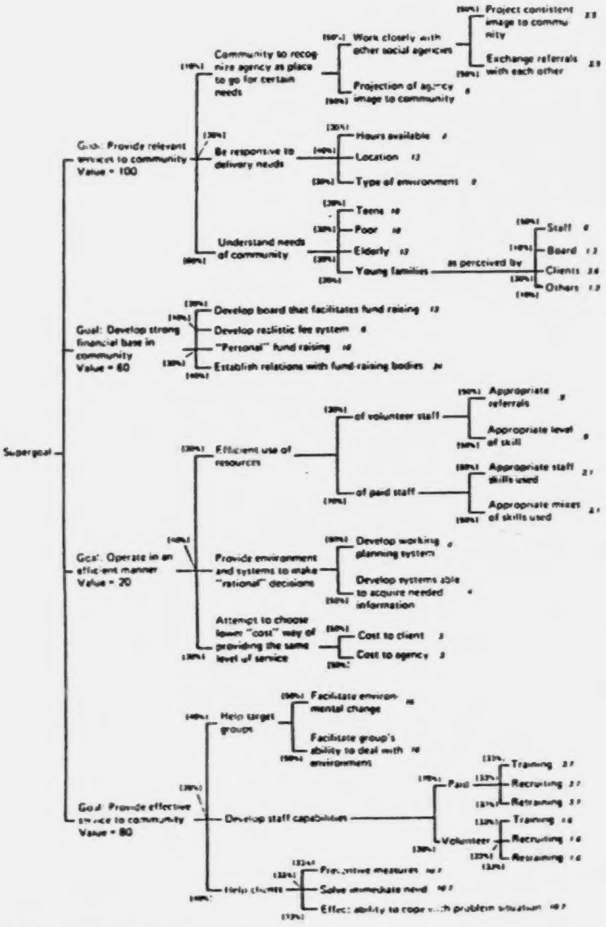
Supergoal
Goal: Provide relevant services to community Value = 100
Community to recognize agency as place to go for certain needs
Work closely with other social agencies
Project consistent image to community
Exchange referrals with each other
Projection of agency image to community
Be responsive to delivery needs
Hours available
Location
Type of environment
Understand needs of community
Teens
Poor
Elderly
Young families
as perceived by
Staff
Board
Clients
Others
Goal: Develop strong financial base in community Value = 60
Develop board that facilitates fund raising
Develop realistic fee system
"Personal" fund raising
Establish relations with fund-raising bodies
Goal: Operate in an efficient manner Value = 20
Efficient use of resources
of volunteer staff
Appropriate referrals
Appropriate level of skill
of paid staff
Appropriate staff skills used
Appropriate mixes of skills used
Provide environment and systems to make "rational" decisions
Develop working planning system
Develop systems able to acquire needed information
Attempt to choose lower "cost" way of providing the same level of service
Cost to client
Cost to agency
Goal: Provide effective service to community Value = 80
Help target groups
Facilitate environmental change
Facilitate group's ability to deal with environment
Develop staff capabilities
Paid
Training
Recruiting
Retraining
Volunteer
Training
Recruiting
Retraining
Help clients
Preventive measures
Solve immediate need
Effect ability to cope with problem situation

Figure 2. Partial value assessment structure

Goals rated on a scale of 0-100.
Percentage contributions shown in brackets.
Calculated value of lowest level objective shown in italics.

Some other examples of trees as research aids have been developed by Amos Tversky and Shmuel Sattath.

> A probabilistic choice model called preference tree or pretree describes choice as a covert hierarchical elimination process. Each alternative is represented as a measurable collection of aspects, and the entire ensemble of aspects is assumed to have a tree structure. At each stage one selects an aspect (i.e., a branch of a tree) with probability that is proportional to its measure and eliminates all the alternatives not belonging to the selected branch. The process continues until a single alternative remains. . . pretree is used to investigate, theoretically and experimentally, the effect of am imposed agenda on the probability of choice" (542 from abstract).

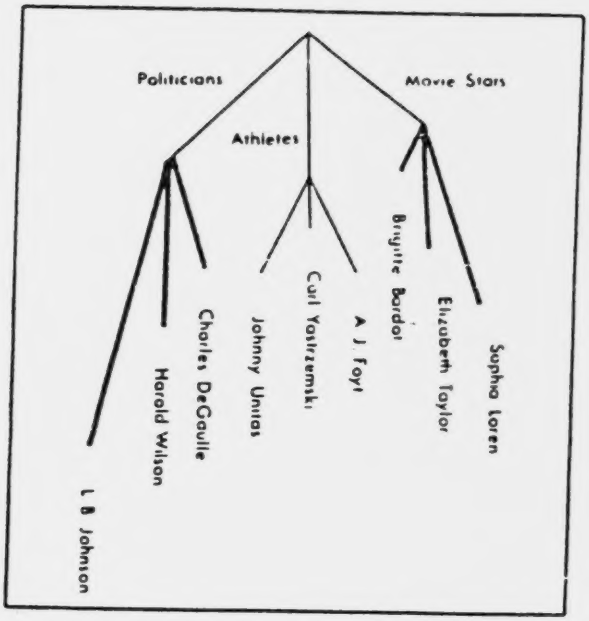
Politicians
Athletes
Movie Stars
L B Johnson
Harold Wilson
Charles DeGaulle
Johnny Unitas
Carl Yastrzemski
A J Foyt
Brigitte Bardot
Elizabeth Taylor
Sophia Loren

Figure 7. Preference tree for choice among celebrities.

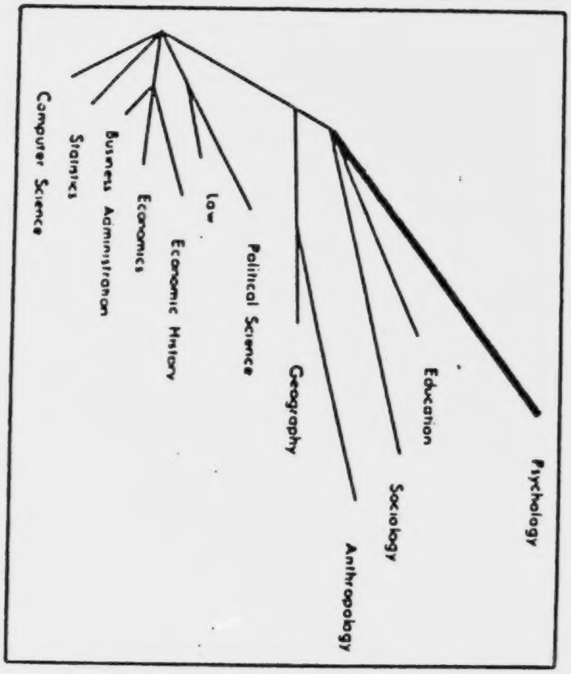
Computer Science
Statistics
Business Administration
Economics
Economic History
Law
Political Science
Geography
Anthropology
Sociology
Education
Psychology

Figure 11. Preference tree for choice among social sciences.

Another article by the same authors describes use of ADDTREE, a computer program, for the representation of similarity data. Examples of three types of additive trees are shown and compared with "multidimensional scaling from both empirical and theoretical standpoints" (319). In an additive tree, as shown here, "each arc defines a cluster which consists of all the objects that follow from it. thus, each arc can be interpreted as the features shared by all objects in that cluster and by them alone. The length of the arc can thus be viewed as the weight of the respective features, or as a measure of the distinctiveness of the respective cluster. For example, the apes (in this representation) form a highly distinctive cluster because the arc labeled 'apes' is very long" (332) (1-Animals, 2-Swedish letters, 3) Occupations).

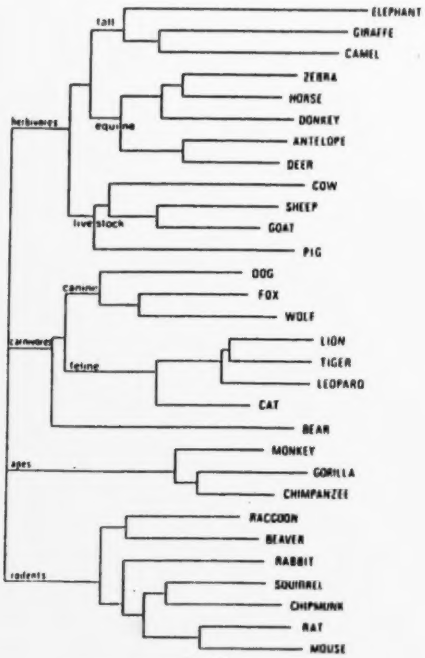
tall
ELEPHANT
GIRAFFE
CAMEL
ZEBRA
HORSE
DONKEY
herbivores
equine
ANTELOPE
DEER
COW
SHEEP
livestock
GOAT
PIG
DOG
canine
FOX
WOLF
carnivores
LION
TIGER
feline
LEOPARD
CAT
BEAR
MONKEY
apes
GORILLA
CHIMPANZEE
RACCOON
BEAVER
RABBIT
rodents
SQUIRREL
CHIPMUNK
RAT
MOUSE

Figure 8
Representation of animal similarities (Henley, 1969) by ADDTREE

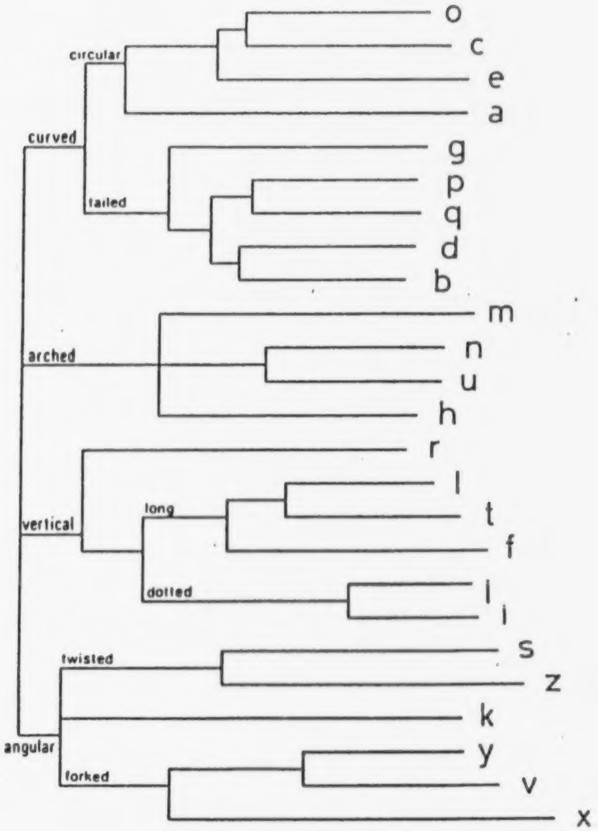
circular
curved
tailed
arched
vertical
long
dotted
twisted
angular
forked
o
c
e
a
g
p
q
d
b
m
n
u
h
r
l
t
f
j
i
s
z
k
y
v
x

FIGURE 10
Representation of letter similarity (Kuennapas and Janson, 1969) by ADDTREE.

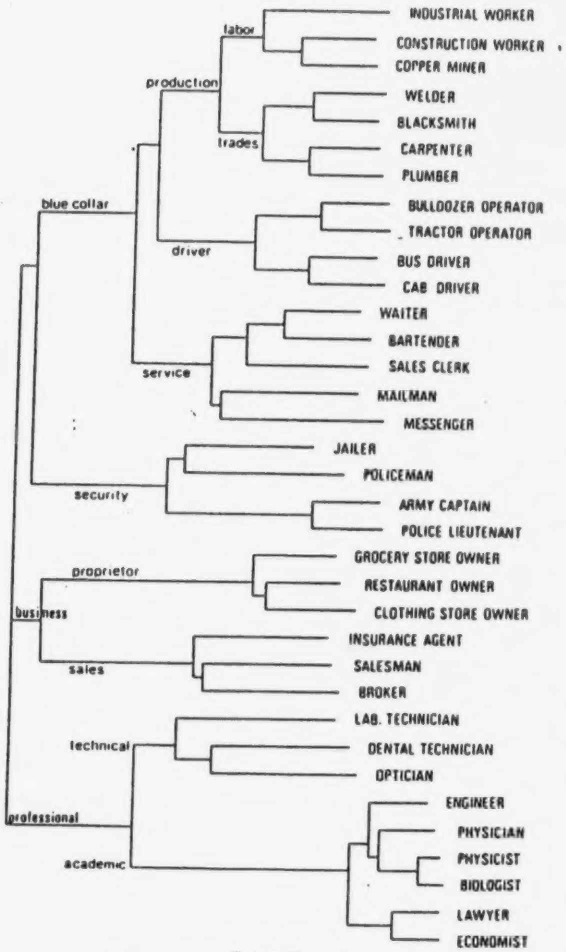
labor
production
trades
blue collar
driver
service
security
proprietor
business
sales
technical
professional
academic
INDUSTRIAL WORKER
CONSTRUCTION WORKER
COPPER MINER
WELDER
BLACKSMITH
CARPENTER
PLUMBER
BULLDOZER OPERATOR
TRACTOR OPERATOR
BUS DRIVER
CAB DRIVER
WAITER
BARTENDER
SALES CLERK
MAILMAN
MESSENGER
JAILER
POLICEMAN
ARMY CAPTAIN
POLICE LIEUTENANT
GROCERY STORE OWNER
RESTAURANT OWNER
CLOTHING STORE OWNER
INSURANCE AGENT
SALESMAN
BROKER
LAB. TECHNICIAN
DENTAL TECHNICIAN
OPTICIAN
ENGINEER
PHYSICIAN
PHYSICIST
BIOLOGIST
LAWYER
ECONOMIST

FIGURE 12
Representation of similarity between occupations (Kraus, 1976) by ADDTREE.

George H. Miller, of Rockefeller University (the place with no students, just researchers ?) says "Part of knowing a language is knowing vocabulary, and it is an appropriate psychological question to ask how this lexical information is subjectively organized and stored. . . . There are multiple interrelations and cross-references in our subjective lexicon" (169). In a paper entitled "A Psychological Method to Investigate Verbal Concepts" a method of sorting 48 common nouns "into clusters on the basis of 'similarity of meaning'" is reported. Data from several judges who sorted the words was pooled(169).

Data from Table I (Sorting Data for 48 English Nouns) has been represented as tree graphs of cluster analysis. "According to the connectedness method, the distance of an item to a cluster is its distance to the nearest member of the cluster. According to the diameter method, the distance of an item to a cluster is its distance to the farthest member of the cluster. In a perfect hierarchical clustering scheme the two methods would give the same results. Here, clusters which are common to the two methods of analysis are indicated by open circles at the appropriate nodes" (180). The author concluded "about 70% of the clusters indicated by the two methods are common to both " (181).

TABLE 1

Sorting Data for 48 English Nouns

KNIGHT																																															
MOTHER	36																																														
COOK	39	41																																													
DOCTOR	40	38	47																																												
UMPIRE	38	36	44	44																																											
FISH	1	1	2	2	2																																										
HORSE	1	2	1	1	1	16																																									
[illegible]	1	3	2	2	1	18	40																																								
PLANT	1	2	1	1	1	21	40	42																																							
TREE	1	2	1	1	1	22	41	43	48																																						
NEST	1	2	1	1	.	10	14	12	9	9																																					
[illegible]	1	.	.	.	.	2	2	1	1	1	5																																				
LABEL	1	1	.	.	.	1	2	1	.	.	14	6																																			
ORNAMENT	1	1	1	.	1	1	3	.	.	.	14	7	18																																		
[illegible]	1	4	3	.	.	1	2	.	.	.	8	12	14	11																																	
GIFT	1	1	1	.	.	1	2	.	.	.	8	12	17	11	40																																
VARNISH	1	.	.	.	.	1	2	.	.	.	8	12	16	14	40	45																															
QUILT	1	2	1	.	.	2	3	2	1	1	17	8	24	24	15	12	13																														
ANCHOR	1	.	.	.	.	4	4	3	.	.	17	9	17	20	13	15	14	21																													
IRON	1	3	2	.	.	1	3	.	.	.	15	8	21	19	24	16	16	27	32																												
JACK	1	.	.	.	.	1	3	.	.	.	15	15	19	19	17	16	16	21	35	41																											
WHEEL	1	.	.	.	.	2	4	1	1	1	13	19	17	16	14	13	13	21	33	34	42																										
SKATE	1	.	.	.	1	3	5	2	1	1	12	8	13	22	8	8	8	18	26	21	20	26																									
YACHT	1	.	.	.	1	5	5	2	1	1	14	7	14	24	8	9	9	19	27	18	18	20	37																								
INCH	.	.	.	.	1	.	.	1	.	.	1	.	9	.	1	1	1	1	1	1	1	1	.	.																							
MEASURE	.	.	.	.	1	.	.	.	.	.	.	.	9	.	.	.	.	.	.	.	.	.	.	.	38																						
NUMBER	.	.	.	.	1	.	.	.	.	.	.	1	10	.	.	.	.	.	.	.	.	.	.	.	37	42																					
ORDER	.	.	.	.	2	.	.	.	.	.	.	.	9	.	.	.	.	.	.	.	.	.	.	.	25	29	30																				
GRADE	1	.	.	.	1	.	.	.	.	.	.	.	11	.	.	.	.	.	.	.	.	.	.	.	27	33	31	44																			
SCALE	.	.	.	.	1	.	.	.	.	.	.	.	9	.	.	.	.	.	.	.	.	.	.	.	29	36	32	42	44																		
HONOR	7	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	2	3	2																	
EASE	.	.	.	1	1	.	.	.	.	.	.	.	.	2	.	.	.	.	.	1	1	1	4	4	.	1	1	1	1	1	8																
FEAR	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	12	25															
REGRET	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	12	25	48														
THOUGHT	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	10	25	42	42													
URGE	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	9	20	37	37	35												
WISH	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	10	20	38	37	35	45											
BATTLE	5	.	.	.	1	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	1	1	2	2	1	1	1	2	.	.	.	1	.										
KISS	5	.	.	1	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	1	1	2	1	1	1	6	2	1	.	.	2	1	40									
AID	2	1	1	2	.	.	.	1	.	.	1	2	1	.	.	1	.	.	.	.	.	.	.	.	.	2	2	3	2	2	2	11	.	.	1	.	.	12	15								
COUNSEL	1	.	.	3	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	2	1	2	2	2	2	9	.	.	1	2	1	5	5	31							
DEAL	.	.	1	2	1	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	1	1	2	1	1	1	1	2	.	.	.	1	2	17	16	13	15						
LABOR	.	.	1	2	1	.	.	.	.	.	.	4	.	.	.	.	.	.	.	1	1	1	.	.	.	2	1	2	2	2	4	7	.	.	1	1	.	17	18	19	11	22					
PLAY	.	.	.	.	4	.	.	.	.	.	.	1	.	4	.	.	.	.	.	.	.	.	7	6	.	2	1	2	2	2	3	7	.	.	3	1	.	16	17	13	6	12	26				
JOKE	.	.	.	1	1	.	.	.	.	.	.	1	.	4	.	.	.	.	.	.	.	.	3	3	1	1	3	2	1	1	1	7	1	.	2	2	3	5	6	10	16	11	5	16			
QUESTION	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	1	1	3	2	1	1	2	3	2	2	2	6	6	5	5	10	18	11	5	6	32		
VOW	1	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1	1	3	2	1	1	8	2	4	3	2	8	10	4	5	9	15	11	3	4	26	32	
YIELD	.	.	.	1	.	1	2	1	1	1	2	10	4	3	1	2	2	2	1	2	2	2	1	2	6	7	8	3	4	5	.	.	.	.	.	.	.	5	6	6	4	15	17	2	3	4	3
	K	M	C	D	U	F	H	R	P	T	N	E	L	O	B	G	V	Q	A	I	J	W	S	Y	I	M	N	O	G	S	H	E	F	R	T	U	W	B	K	A	C	D	L	P	J	Q	V

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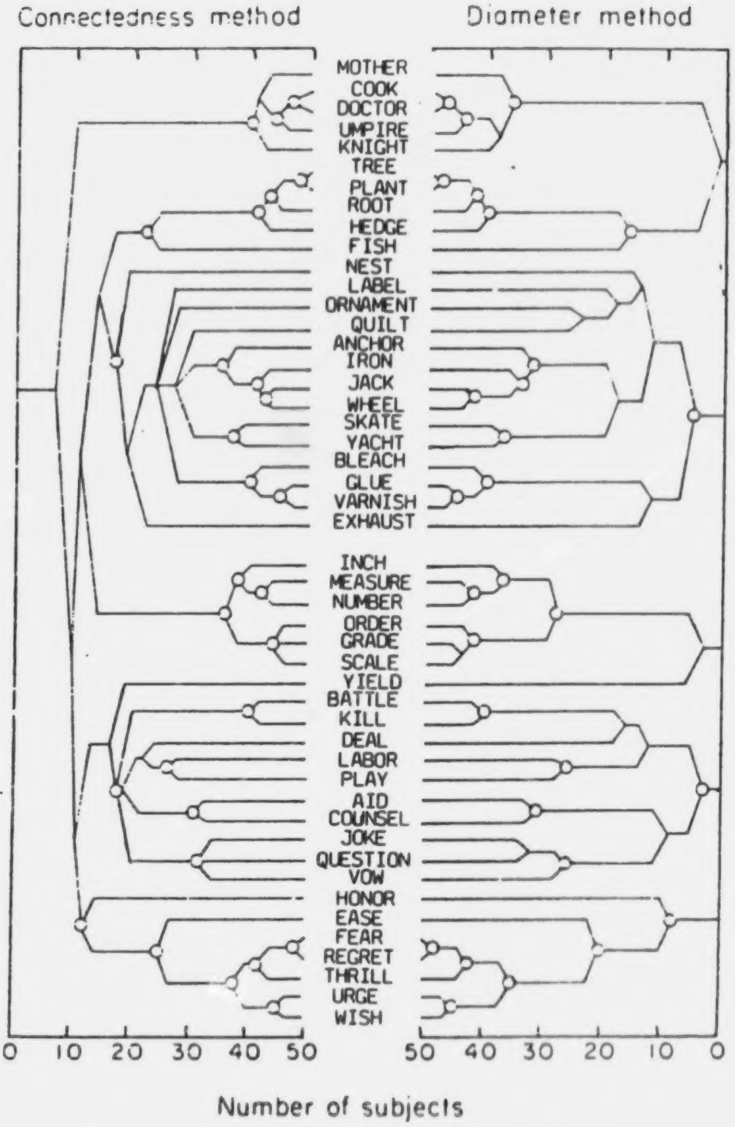


FIG. 2. Tree graphs of cluster analysis applied to data on 48 English nouns sorted by 50 judges (see Table 1). According to the connectedness method, the distance of an item to a cluster is its distance to the nearest member of the cluster. According to the diameter method, the distance of an item to a cluster is its distance to the farthest member of the cluster. In a perfect hierarchical clustering scheme the two methods would give the same results. Here, clusters which are common to the two methods of analysis are indicated by open circles at the appropriate nodes.

J. A. Hartigan of Princeton, illustrated "construction technique applied to voting behaviour of the 50 United States in the [last] 13 presidential elections, giving a tree clustering of the states." Details of the graphing procedure are given in the article. The tree is based on "correlation of the Democratic percentage of Presidential vote, 1916-1964" (1140).

AMERICAN STATISTICAL ASSOCIATION JOURNAL, DECEMBER 1967

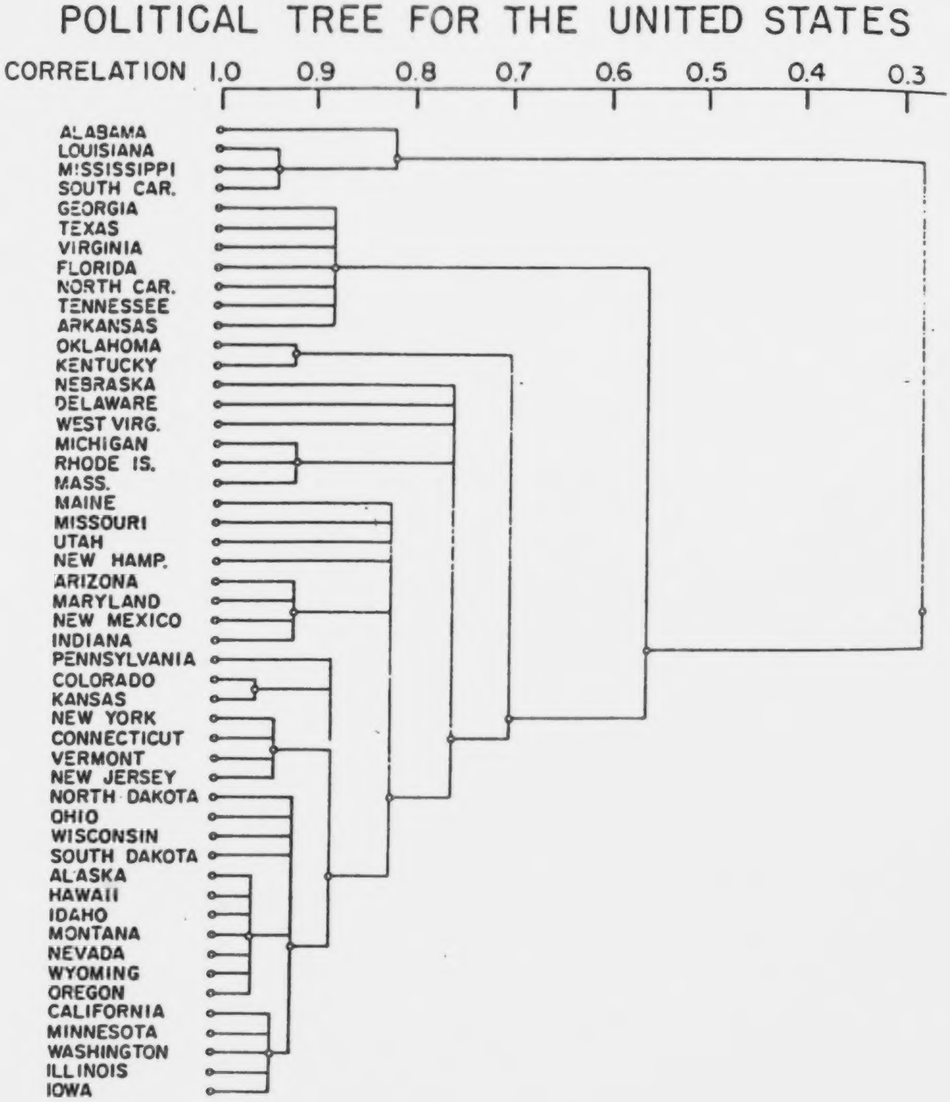
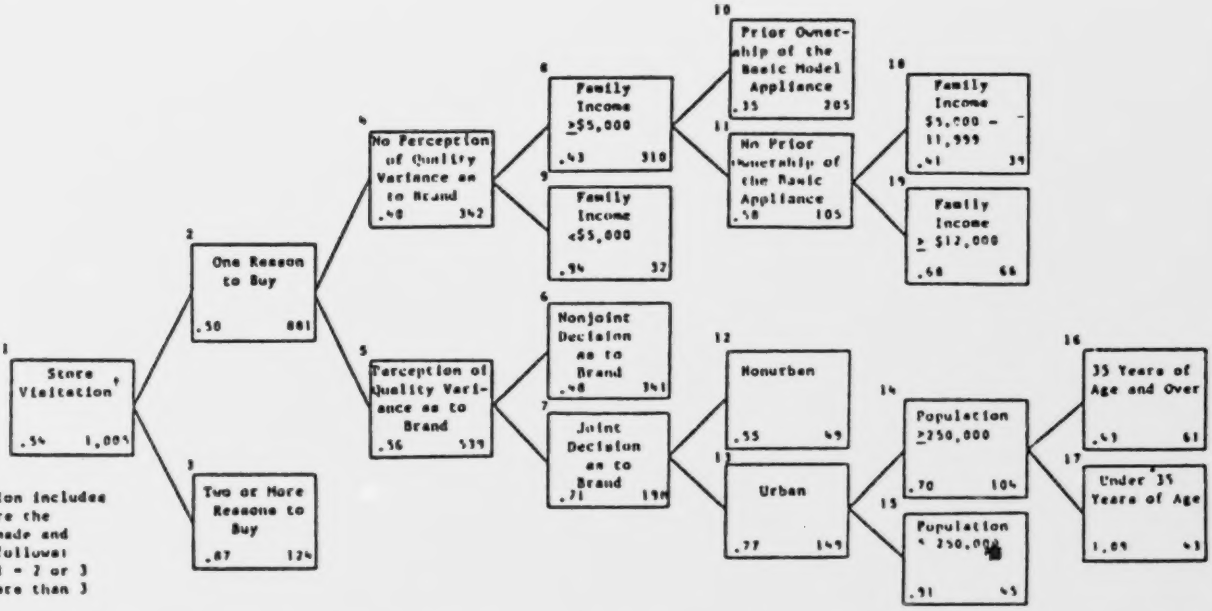

POLITICAL TREE FOR THE UNITED STATES
CORRELATION
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
ALABAMA
LOUISIANA
MISSISSIPPI
SOUTH CAR.
GEORGIA
TEXAS
VIRGINIA
FLORIDA
NORTH CAR.
TENNESSEE
ARKANSAS
OKLAHOMA
KENTUCKY
NEBRASKA
DELAWARE
WEST VIRG.
MICHIGAN
RHODE IS.
MASS.
MAINE
MISSOURI
UTAH
NEW HAMP.
ARIZONA
MARYLAND
NEW MEXICO
INDIANA
PENNSYLVANIA
COLORADO
KANSAS
NEW YORK
CONNECTICUT
VERMONT
NEW JERSEY
NORTH DAKOTA
OHIO
WISCONSIN
SOUTH DAKOTA
ALASKA
HAWAII
IDAHO
MONTANA
NEVADA
WYOMING
OREGON
CALIFORNIA
MINNESOTA
WASHINGTON
ILLINOIS
IOWA

FIG. 2

Here is a different type of tree, AID stands for Automatic Interaction Detection. This tree is concerned with providing "insights into the cost-value implications of retail store visitation...by relating the extent of retail store visitation to both consumer characteristics and situational variables in the context of a major applicance purchase." A table giving "Predictor Variables" for the analysis lists "consumer characteristics" and "Situational Variables" (213) [The input for the AID algorithm consists of 1,005 purchases of a major home applicance during 1974].

AID TREE FOR RETAIL
STORE VISITATION[a][b]

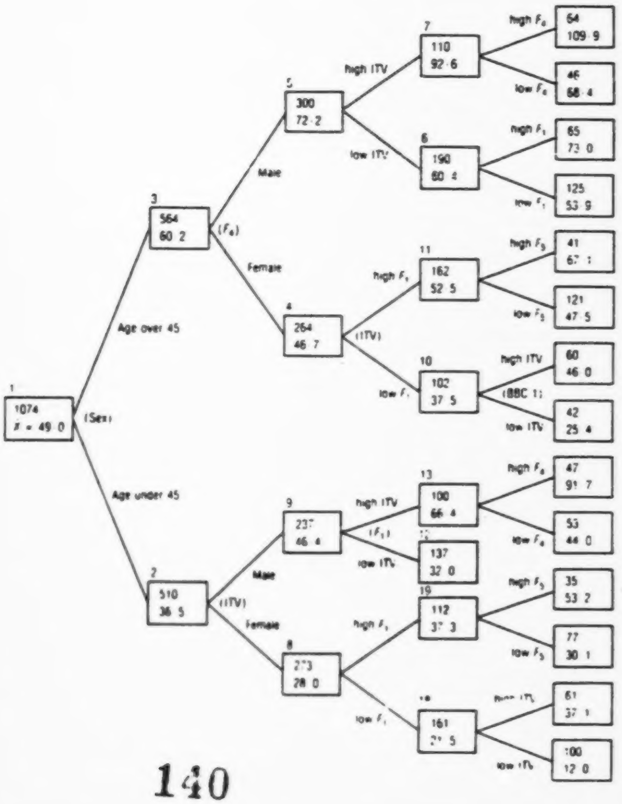

1
Store Visitation†
.54 1,005
2
One Reason to Buy
.50 881
3
Two or More Reasons to Buy
.87 124
4
No Perception of Quality Variance as to Brand
.48 342
5
Perception of Quality Variance as to Brand
.56 539
8
Family Income ≥$5,000
.43 310
9
Family Income <$5,000
.94 32
6
Nonjoint Decision as to Brand
.48 341
7
Joint Decision as to Brand
.71 198
10
Prior Ownership of the Basic Model Appliance
.35 205
11
No Prior Ownership of the Basic Appliance
.58 105
18
Family Income $5,000 - 11,999
.41 39
19
Family Income ≥ $12,000
.68 66
12
Nonurban
.55 49
13
Urban
.77 149
14
Population ≥250,000
.70 104
15
Population < 250,000
.91 45
16
35 Years of Age and Over
.43 61
17
Under 35 Years of Age
1.09 43

[†] Store visitation includes the store where the purchase was made and was coded as follows: 0 = 1 store; 1 = 2 or 3 stores; 2 = more than 3 stores.

[a] Store visitation means appear in the lower left corner and number of respondents in the lower right corner of each box.

[b] Minor missing values appear as categories in groups 2, 4, 7, 8, 10, 16 and 19.

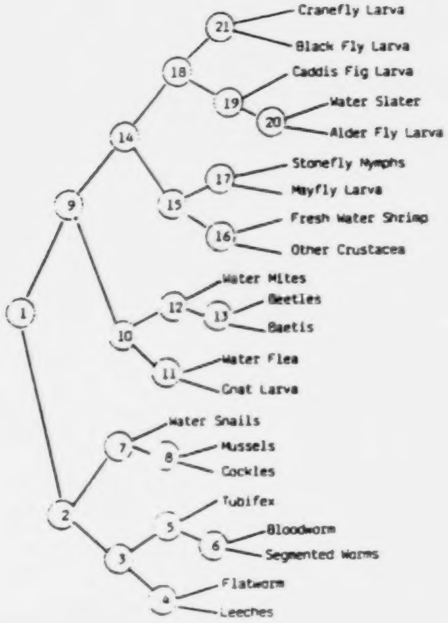
Doyle and Fenwick's article makes an analysis of "a 1972 study of the Sunday reading habits of a representative sample of over 2000 adults in the United Kingdom. In personal interviews, respondents provided information about media usage, attitudes, and a large number of socio-economic characteristics. This article relates to one aspect of media usage--time spent reading newspapers. . . A goal of the research reported here was to determine the characteristics of these readers" (82). The tree "Correlates of Readership" appeared to indicate that the "heaviest readers are older males, are heavy watchers of ITV, and have strong 'male interests'. By contrast, younger women who were low ITV viewers and interested in articles about "people" read on average little more than one tenth of the time spent by the heaviest readers. . ." (82).


1
1074
x̄ = 49 0
(Sex)
Age over 45
Age under 45
3
564
60 2
(F_4)
Male
Female
5
300
72 2
4
264
46 7
(ITV)
high ITV
low ITV
7
110
92 6
6
190
60 4
high F_1
low F_1
11
162
52 5
10
102
37 5
high F_4
64
109 9
low F_4
46
68 4
65
73 0
125
53 9
high F_5
41
67 1
low F_5
121
47 5
high ITV
60
46 0
(BBC 1)
low ITV
42
25 4
2
510
36 5
(ITV)
Male
Female
9
237
46 4
(F_1)
13
100
66 4
137
32 0
47
91 7
53
44 0
8
273
28 0
19
112
37 3
161
21 5
35
53 2
77
30 1
61
37 1
100
12 0

Correlates of Readership: the AID Tree

Classification in one way or another, takes place in most disciplines, Alex Lake and Geoffrey Strack reported in the April 1986 issue of The Computing Teacher advantages of a program called Identify in which students may extract one field from a file, and then formulate and insert questions that will divide up to form a binary key tree. According to the authors, using this computer program saves time, is more flexible, and has increased the quality of student studies in field work in biology courses (13). A sample print-out looks like this.

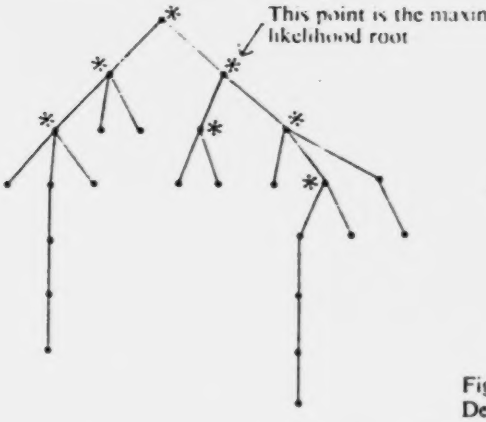
The Computing Teacher
April 1986
page 13


21
Cranefly Larva
Black Fly Larva
18
Caddis Fig Larva
19
Water Slater
20
Alder Fly Larva
14
17
Stonefly Nymphs
Mayfly Larva
9
15
Fresh Water Shrimp
16
Other Crustacea
Water Mites
12
Beetles
13
Baetis
1
10
Water Flea
11
Gnat Larva
Water Snails
7
8
Mussels
Cockles
Tubifex
2
5
6
Bloodworm
Segmented Worms
3
Flatworm
4
Leeches

1) Does it have legs?
2) Does it have a shell?
3) Is it cylinder shaped?
4) Does it glide along the bottom?
5) Are there lots of them together?
6) Are they transparent?
7) One shell?
8) Large shell?
9) Lives on the bottom?
10) Swims swiftly?
11) Roundish?
12) Small and round?
13) Rounded back?
14) Slow mover?
15) Clings to stones?
16) Swims on its side?
17) Two tail prongs?
18) Cylinder Shaped?
19) Case of sticks or stones?
20) Like a woodlice?
21) Like a large maggot?

Figure 1.
Dichotomous key produced from the program Identify and used by students to aid identification in the field. Students insert questions and input the organisms according to whether the organism has the attribute or not.

Items of especial interest to scholarly researchers are found in Mathematics in the Archaeological and Historical Sciences, a report of a 1970 Anglo-Romanian Conference. Haigh's "Manuscript Linkage Problem" gives illustrations of an algorithm for establishing "the maximum likelihood choice as root." Without showing the computations on which these trees are based, they Will simply indicate the nature of some literary research that was done under the heading of "Filiation of Manuscripts" (399).


This point is the maximum likelihood root

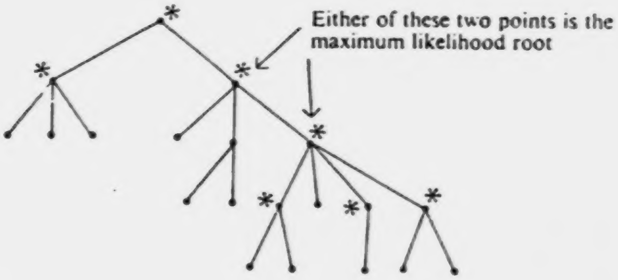

Either of these two points is the maximum likelihood root

Figure 4. The reconstructed family tree of the Continental Version of Bede's Death Song (Dobbie 1937)

Figure 3. The reconstructed family tree of Caedmon's Hymn (Dobbie 1937)

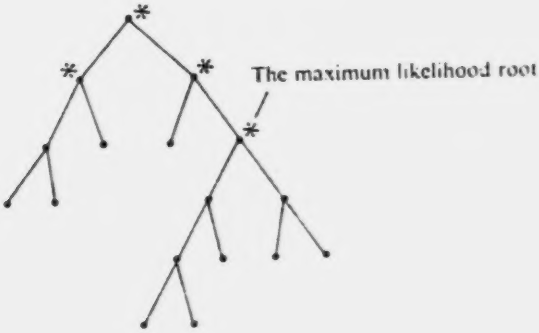

The maximum likelihood root

Figure 5. The stemma of Cicero's Letters to Atticus (Shackleton Bailey 1965)

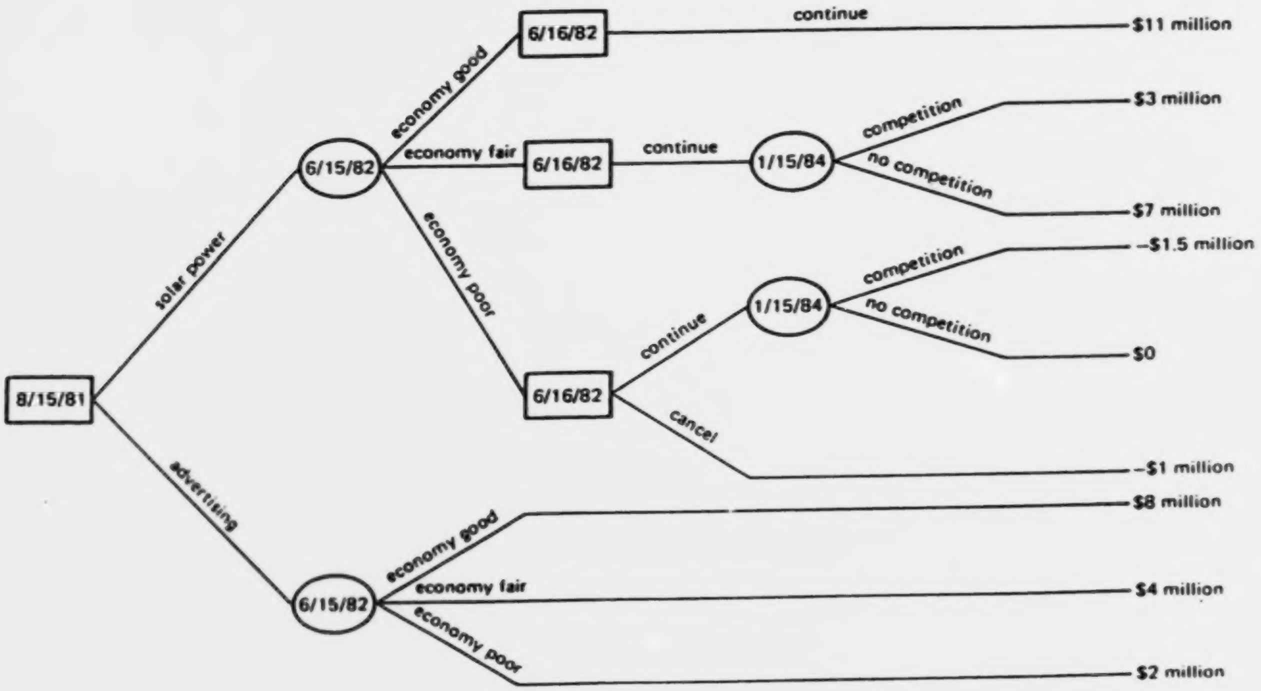
Braverman's trees indicate a sequence of timed events or circumstances.

> The decision dates are entered at each decision node and then checked to be sure that all the alternatives branching from that node are available at that date and that an irrevocable choice of one of those alternatives must be made at that date. The resolution dates are also entered at each chance node. . . Finally, the entire decision diagram should be checked to be sure that the proper chronological order is maintained when reading from left to right (79). . . In a sense, the decision tree is like a roadmap. If the decision maker selects a_1 and nature chooses s_1, the path leads to the consequence (80). . . It is helpful to prune or simplify a tree by eliminating branches whenever possible (84).

This tree illustrates Braverman's method.

SUMMARY OF THE CASE: On August 15 the president of Thermocal must make a "recommendation to the board of directors, on whether to proceed with the development of a new solar power system, initiate a new advertising campaign, or maintain the status quo" (93). Status quo was eliminated and not considered in the decision, rather than probabilities, the states of nature uch as "economy good" or "economy poor and competition" are shown on the branches. The figures at the end of the branches represent expected profits or losses.

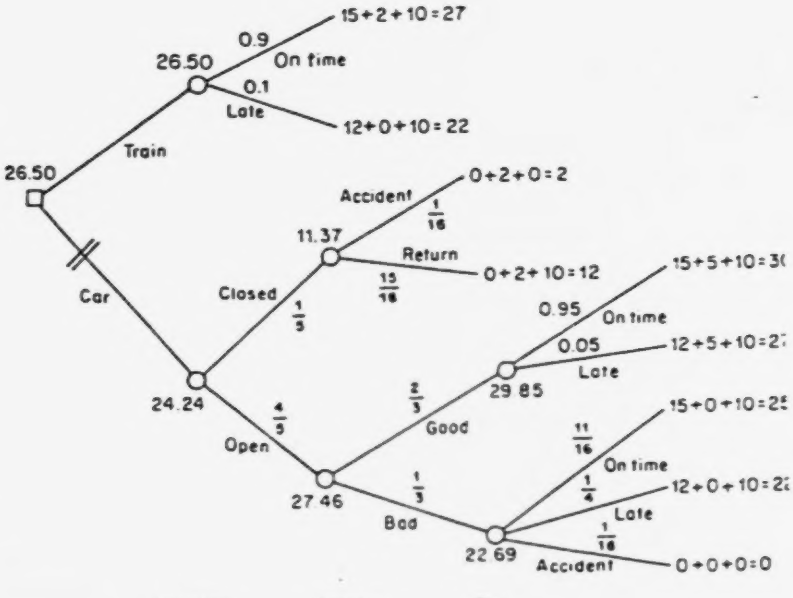
FIGURE 6.20 Complete decision tree for Thermocal multistage decision situation.


8/15/81
solar power
advertising
6/15/82
economy good
economy fair
economy poor
6/16/82
continue
$11 million
6/16/82
continue
1/15/84
competition
$3 million
no competition
$7 million
6/16/82
continue
1/15/84
competition
−$1.5 million
no competition
$0
cancel
−$1 million
6/15/82
economy good
$8 million
economy fair
$4 million
economy poor
$2 million

Another time related tree is the mountain-pass example given by Lindley. Lindley comments that

> Like a real tree, a decision tree contains several parts that act together, or cohere. Our method solves the easier problems that occur at the different parts of the tree and then uses the rules of probability to make them cohere. . . It is the coherence that is the principal novelty and the major tool in what we do (139).

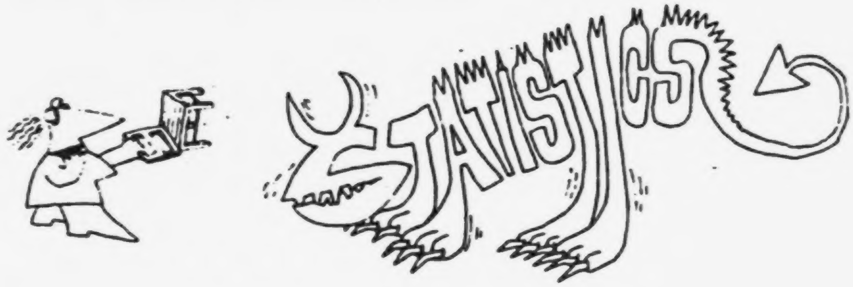
He says that this is a simple tree with simple analysis but hard to assess because of the "non-quantitative nature of the problem in its original formulation" (154). A traveler is trying to decide to use his car, or take the train across a mountain chain in winter, in order to attend a meeting. We are reminded that the values inserted represent the individual's preferences, and could be changed but they do achieve coherence. Utility values must cohere with related quantities in decision problems.


15+2+10=27
0.9
On time
26.50
0.1
Late
12+0+10=22
Train
26.50
Accident
0+2+0=2
1/16
11.37
Return
0+2+10=12
15/16
Car
Closed
1/5
15+5+10=3
0.95
On time
0.05
12+5+10=2
Late
24.24
4/5
2/5
29.85
Good
15+0+10=2
11/16
Open
On time
1/4
12+0+10=2
27.46
1/5
Late
Bad
1/16
22.69
Accident
0+0+0=0

Meeting		Journey		Car	
On time:	15	Good:	5	No accident:	10
Late:	12	Indifferent:	2	Accident:	0
Missed:	0	Bad:	0		

Figure 8.5. Decision tree for the mountain-pass example

Taming the Statistical Beast



Source: Cartoon by Tony Hall. From Sarah M. Dinham, *Exploring Statistics: An Introduction for Psychology and Education*, title page. Copyright 1976 by Wadsworth, Inc. Reprinted by permission of the publisher, Brooks/Cole Publishing Co., Monterey, Calif. 93940.

Wm. G. Zikmund. Business Research Methods.
New York: Dryden Press, 1984. Ch. 13, p. 210.

SLIDES "From Family Trees to Decision Trees"

Cartoon (soup tasting)

1 - Human Hierarchy

2 - Hierarchy of Personal Achievement

3 - Hierarchy for Choosing a School

4 - Three jobs for new Ph.D.
5 - Pairwise Comparison Scale
6 - Three jobs for new Ph. D. (with calculations)

7 - Family Tree - Genealogy of Psychology

8 - Probability tree for penny tossing

9 - Worth tree for purchase of a Home
10 - Worth Tree Table for three homes

11 - Saaty's Hierarchy for Purchasing a House
12 - Saaty's Architectural Space

13 - Rubinstein's relevance tree - "Best Job"
14 - Best Auto (Trobian)
15 - Rubinstein's Nine Steps to construct relevance trees

16 - Francoeur's Widow - Decision Tree 10-1
17 - Francoeur's Probability Table
18 - Francoeur's Decision Tree 10-2
19 - Francoeur's Decision Tree 10-3
20 - Different Types of Additive Trees
21 - Huffman Code Tree Construction Algorithm
22 - Social Work Agency - Partial Value Assessment
23 - Preference Trees
24 - ADDTREE similarities - Animals
25 - - Letters
26 - - Occupations
27 - 48 common nouns - Table
28 - 48 common nouns tree
29 - Political Tree
30 - AID Tree - Retail Store
31 - AID Tree - Correlates of Readership
32 - Classification: Identify Biology Field Work
33 - MSS Linkage Problem
34 - Braverman's Time Sequence Decision Tree
35 - Mountain Pass Tree
36 - Summary of AHP
37 - Statistical Beast

Bibliography

Aaker, David A. (ed.) Multivariate Analysis in Marketing. (2nd Ed.). Palo Alto, CA: Scientific Press, 1981.

Austin, Larry M. and James R. Burns. Management Science. New York: Macmillan, 1985.

Baker, AlanJ. Business Decision Making. New York: St. Martin's Press, 1981.

Behn, Robert D. and James W. Vaupel. Quick Analysis for Busy Decision Makers. New York: Basic Books, 1982.

Bodily, Samuel E. Modern Decision Making. New York: McGraw Hill, 1985.

Braverman, Jerome D. Management Decision Making. New York: ANACOM, 1984.

Breiman, Leo, Jerome H. Friedman, Richard A. Olshen, and Charles Stone, Jr., Classification and Regression Trees. Belmont, CA: Wadsworth International Group, 1984.

Buneman, Peter. "The Recovery of Trees from Measures of Dissimilarity," in Mathematics in the Archaeological and Historical Sciences. Edinburgh: University Press, 1971.

Carroll, J. Douglas and Jih-Jie Chang. "A Method for Fitting a Class of Hierarchical Tree Structure Models to Dissimilarities Data and its Application to Some "body parts" data of Miller." Proceedings, 81st Annaual Convention, APA, 1973.

Courcelle, B. (ed.) Ninth Colloquium on Trees in Algebra and Programming. 5-7 March 1984. Gordeaux, France. Cambridge (NY): Cambridge University Press, 1984.

Cayley, Arthur. The Collected Mathematical Papers of Arthur Cayley. Cambridge: University Press, 1890. (Items on "trees" in Vols. III, IV, XI, VI, IX, X, XIII).

Drezner, Stephen M. "The Emerging Art of Decision Making." Social Casework, 54: 1 (January 1973) 3-12.

Francoeur, Robert T. Biomedical Ethics: A Guide to Decision Making. New York: JOhn Wiley & Sons, Inc., 1983.

Gass, Saul I. Decision Making, Models and Algorithms. New York: John Wiley and Sons, 1985.

Gladwin, Christina H. "Contributions of Decision-Tree Methodology to a Farming Systems Program." Human Organization. 42:2, (1983).

Greer, Rick. Trees and Hills : Methodology for Maximizing Fucntions of Systems of Linear Relations. New York: North Holland, 1984.

Hammond, John S. III. "Better Decisions with Preference Theory." Harvard Business Review. November December 1967. 123-141.

Hartigan, J. A. "Representation of Similarity Matrices by Trees." Journal of the American Statistical Association. 62: 1140-1188. (1967).

Jacobs, Harold R. Mathematics: A Human Endeavor. San Francisco: W. H. Freeman and Co., 1970.

Lauffler, Armand. Grantsmanship and Fund Raising. Beverly Hills: SAGE Publications, 1984.

Lindley, D. V. Making Decisions (2nd ed.). New York: John Wiley & Sons, 1985.

Lonial, Subhash C. and Stuart Van Auken. "Retail Store Visitation and the Cost-Value Hypothesis: An Application of the AID Algorithm." 9th Annual Conference, American Institute dor Decision Sciences (1977). Ed. Justin D. Stolen & J. Conway, U. of Nebraska at Omaha, 1977.

Magee, John F. "Decision Trees for Decision Making." Harvard Business Review. 42/4 July-August 1964: 126-138.

Penrod, Steven and Reid Hastie. "A Computer Simulation of Jury Decision Making." Psychological Review. 87/2 (1980) 133-159.

Posner, Barry Z. and W. Alan Randolph. "A Decision Tree Approach to Decide When to Use Different Pedagogical Techniques." Exchange: The Organizational Teaching Journal. III/2 (1978) 16-19

Rall, Wilfrid. "Branching Dendritic Trees and Motoneuron Membrane Resistivity." Experimental Neurology. 1: 491-527 (1959)

Rubinstein, Moshe. Tools for Thinking and Problem Solving. Englewood Cliffs, N.J.: Prentice-Hall, 1986.

Saaty, Thomas L. Decision Making for Leaders. Belmont, CA: Wadsworth, 1982.

Saaty, Thomas L. and Joyce M. Alexander. Thinking with Models. New York: Pergamon Press,1981.

Sattath, Shmuel and Amos Tversky. "Additive Similarity Trees." Psychometrika. 42/3 (September 1977) 319-345.

Serre, Jean-Pierre. Trees. New York: Springer-Verlag, 1980.

Strack, Geoffrey. "The Computer Takes a Field Trip." The Computing Treacher. (April 1986) 12-17,64.

Tversky, Amos and Shmuel Sattah. "Preference Trees." Psychological Review. 86/6 (1979) 542-573.

Vroom, Victor H. "A New Look at Managerial Decision Making." Organizational Dynamics. 1975.

Waddington, C. H. Tools for Thought New York: Basic Books, Inc., 1977.

Weick, Karl E. "Rethinking Research on Decision Making" Decision Making. Boston: Kent, 1982. 325-333.

Facilitating Critical Thinking in Clinical Practice

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FACILITATING CRITICAL THINKING IN CLINICAL PRACTICE

INTRODUCTION

As nurse educators there have been frustrations because of the stress students experience in the medical/surgical semester. The faculty are acutely aware of the heavy reading load the students must complete to pass the examinations in the course. In addition, the lectures are two to three hours in length and contain complex pathophysiological concepts and nursing care. While the students get more information than they really need, even "bare bones" data would be overwhelming. As students sit through the lectures, they are unable to keep up with the note taking let alone assimilate the information being presented. If, after hours of droning on and on, the faculty member begins to doze off and "space out", how can the students be blamed for doing the same? So what could be done to increase student learning and decrease student stress?

A light bulb went on when Dean Osterman came to CSU, Chico and talked about the feedback lecture and demonstrated how it could incorporate some exciting changes. Keep in mind that skepticism and resistance remained. It sounded excellent for other disciplines that were not so technical or life and death oriented Also, traditional methods were safe and did not involve the stress of change. There were several questions to be answered: Could any of the didactyl material be eliminated up? What if a large percentage of students flunked examinations? Ultimately, what if students failed the state board examination? These and many other problems had to be overcome.

After attending Dean Osterman"s workshop, the presenters were impressed and had tangible data to use. The decision was to test the student's learning styles, reevaluate the lectures, and examine the lectures to incorporate some of these ideas.

As the abstract points out, the presenters will share their experiences and how they are facilitating learning for individuals with various learning styles and provide activities which promote the transfer of theoretical knowledge into clinical practice. Specifically, the presenters will look at the application of critical incidents, feedback lectures, case studies, and computer assisted interactive video instruction.

LEARNING STYLES

People tend to learn predominately through one learning style, and there are several tools on the market which will determine an individual's learning style. Most of them identify four basic learning styles, and while they are given different names, most focus on 1) hypothetical-deductive reasoning, 2) creative or imaginative thinking, 3) inductive reasoning, and 4) trial and error. According to some studies, individuals with similar learning styles tend to end up in similar professions or jobs. For instance, people in counseling tend to be creative learners, and people in science and mathematics tend to be inductive learners.

It could be assumed, then, that the majority of students in the nursing program learn predominately through one learning style. However, four nursing faculty were tested with the Kolb Learning Style Inventory, and they represented four different learning styles. The question arose as to whether they were odd, or was it just coincidence that they were in four different learning styles or were all four learning styles equally represented in nursing in general? It was then decided that to improve teaching/learning effectiveness, it would be prudent to know if nursing students have a predominate learning style. As the basic teaching methods in the nursing program are lecture/discussion and clinical (hands on) application, students who learn best by hypothetical\deductive reasoning and by trial and error have their learning needs met. The other students, however, are being forced into a learning style that is foreign to their learning behavior and, therefore, are probably not doing as well in nursing as they could. By determining the numbers of students who learn by creative thinking or inductive reasoning, different teaching methods could be employed to challenge them in a cost effective but appropriate way. Therefore, the students in the medical/surgical and capstone semesters were tested for their learning styles using a standard test. The students in these semesters were chosen because they represent students early in their nursing education and late in their nursing education. Therefore, comparison can be made to see if students change their learning style. Also, these two groups are accessible to the presenters. Although the project has just begun, this testing is part of a longitudinal study that will continue for several more years.

Interestingly, most of the nursing students at CSU, Chico are accommodators (22) and divergers (23) on the Kolb Learning Inventory. The accommodators are adaptable and solve problems by trial and error. Divergers excel in brainstorming and are imaginative. Sixteen of the nursing students were convergers (practical application and hypothetical/deductive reasoning). The remaining nine were assimilators which are the people with inductive reasoning. There were differences in the two groups, but it is unknown if these differences are because the two groups are vastly different or if students change learning styles. It could be, also, because of the "hands on" emphasis in clinical that students think they learn best this way because they feel this is "real" nursing. ("If I do it all the time, it must be the way I learn best")

The theory on learning styles was one reason for a change in teaching methods. Another reason to change is to reduce student stress especially in the clinical setting. In the program at CSU, Chico a systems approach to medical/surgical nursing is used. Nursing students read 100-200 pages per course, plus 8-10 hours of lecture, plus 8-15 hours of clinical per week. Preparing for the clinical experience requires several hours of preparation plus 1-3 papers or logs as part of that preparation. In addition to the actual work each week, nursing students have high anxiety due to the nature of their clinical learning experience. Anyone dealing with the public knows it is difficult to keep everyone happy. This is even more difficult when "the public" is a sick patient or concerned family member. Also, many of the things nurses do cause pain or discomfort or are rather disgusting. (Never eat lunch with a nurse.) In addition, a nursing student is responsible for the patient"s life and health. Making a medication error can be life threatening and telling the instructor can devastate even the best of students no matter how understanding the instructor tries to be. All of this adds up to the stress in the clinical setting. For the new nursing student it may take 1-2 hours just to get up the courage to go into a patient's room. The attempt to reduce this student stress is another reason for a change in teaching methods.

The third reason for a change in teaching methods is the one previously mentioned. Both faculty and students tend to "tune out" during 2-3 hours lectures. Students can not assimilate information after that long. All they do is write down the instructor's words verbatim--including sneezes. The instructor, meanwhile, is thinking about the committee work that needs to be done and will her voice last another hour.

FEEDBACK LECTURE

What is the feedback lecture? That question will be answered as well some ideas on how to incorporate it into classes. The feed back lecture was created out of need. Research has shown that for a multitude of reasons, the traditional lecture may not be the best process to deliver information. For instance, a high percentage of content delivered through lecture is usually forgotten. It is dreadfully difficult to listen, let alone concentrate for 1-3 hours hearing the same voice and writing madly, making it impossible to integrate or have time to reflect on the information just obtained.

The primary goals to accomplish using the feedback lecture were:

1. integrate a method of teaching that attempted to match teaching and learning styles,
2. increase student involvement--making them active participants in the learning process.
3. increase the student's retention of the content, broaden their critical thinking process, and motivate problem-solving techniques.

While the feedback lecture sounded wonderful in theory, there were still concerns regarding how to actually implement it. To begin with, the presenters assessed what was presently being done:

1. continue with the extensive syllabus with detailed reading assignments, objectives, outlines, practice questions to answer, and practice worksheets.
2. continue with examinations oriented towards integrating theory and practical application--students must be able to apply the pathophysiological facts into their nursing care and the answers.
3. increase the use of questions to elicit information from students and to increase student participation
4. increase the use of audio-visual materials and guest lecturers
5. increase the use of analogues and real situations in the clinical setting to promote understanding of theory and discussions.

Next, the actual lecture was investigated. It was decided to break up the formal lecture in the following manner. The traditional lecture format is used for the first 35-40 minutes incorporating audio-visual materials, questions, examples, and humor. The lecture then gives the entire class a problem or activity which is directly related to the content presented and uses the nursing process. Some examples are:

Assessment

1. Identify a assessment parameters for a patient with congestive heart failure.
2. Discuss the effects of immobility on the cardiovascular or pulmonary system.

Plan

1. Develop a care plan for a patient with an acute heart attack.
2. Develop a care plan for the newly diagnosed insulin dependent diabetic.

Intervention

1. Provide a grieving spouse with time to talk and vent his//her fears and concerns.
2. Teach positions to an arthritic patient that will decrease pain during sexual intercourse.

The students then break up into pre-assigned groups of four to work on the assignment. The groups were pre-assigned, and are groups of four based on setting arrangements. This was done to reduce time spent on getting into groups. One student is the recorder and takes notes of the discussion. The students then come back to the full group and discuss their conclusion and ideas. The faculty acts as a facilitator. At the end of each class session, the groups turn in their work to be checked off by the faculty.

Thus far, the evaluations are very positive. The class attendance has remained high, the students seem to be better prepared for the lecture. (In the past, keeping up with the reading assignments has been a major problem.) The test scores are not noticeably different. There will be continual evaluation by the students and faculty and appropriate changes will be made.

DECISION MAKING MODEL

Nursing is a practice discipline in which clinical decisions must be made which affect the patients health and, in many instances, the patient's life. Some decisions must be make quickly and acted upon immediately. In addition many of the decisions to be made are based on complex pathophysiological and biopsychosocial phenomena. To add to this dilemma is the fact that no two situations are the same.

In order to make a smooth safe transition from theory to application, simulation materials have been developed over the past 18 months. These simulations assist students (and nurses) in making decisions involving pathophysiology, nursing care and related medical data. The interest in this topic evolved as a result of experience with nursing students who had a good grasp of theory content (based on their examination scores), but also had significant difficultly functioning in the clinical setting. It was felt that this behavior was predominantly related to their inability to put "all the pieces together" in a rational manner and then make clinical decisions based on their perceptions.

The observations made on the students was not unlike the behavior described by Patricia Benner in her book From Novice to Expert in regards to decision making patterns used by nurses in various stages of their professional development.

Benner describes the novice nurse as most frequently using context-free rules to guide his/her actions. The novice nurse possesses objective information which can be recognized clinically, but has no situational experience. Typically, the novice will exhibit rule-governed behavior which for professional nursing is extremely limited and inflexible. Further, this behavior undermines performance, because rules do not address the relevancy of tasks performed in a given situation. As a result, this person has limited ability to prioritize and function.

Having described the novice, consider the other end of the continuum, the expert nurse. The expert can be defined as a nurse who has an intuitive grasp of situations and can focus in on problems and solutions. This is not to imply that the expert nurse never makes mistakes. Rather it is said in reference to his/her perceptual acuity. It is supported in the literature that experience is one of the key factors in one's ability to make sound clinical decisions. This premise is based on encounters with many actual, practical situations. It is the belief of the presenters that experiences which can assist the novice in moving to expert can also be obtained through the use of simulated clinical encounters.

To assist students in obtaining clinical experiences through simulation, a format has been developed in which students use a decision making model to work through assigned clinical problems. This use of simulations allows the students to apply knowledge and practice making decisions. A very desirable feature of this format is the fact that students can make these decisions in a controlled environment, without injuring patients, thus decreasing stress for students (and instructor) and, thereby, increasing learning.

The model that has been designed was adapted from the 1982 Bailey and Hendricks decision making model. The goal of the model is to make the decision making process instinctive. Using the model, there are two types of decisions the learner will be asked to make: given a scenario, the learner must decide either 1) what additional data is needed or 2) what solutions would be most appropriate in the described situation. If a situation required a data gathering mode, the nurse must brainstorm to determine appropriate assessment parameters encompassing biopsychosocial dimensions. If the situation requires an immediate solution, the student must brainstorm for all possible solutions to the problem. After all feasible solutions have been considered, the student compares alternatives and evaluates the solution based on feasibility, legality, safety, and ethical considerations. From this evaluation comes the optimal solution which the student would put into practice.

CRITICAL INCIDENTS

Simulated clinical encounters have been designed for use in small group settings, usually post clinical conferences. To begin the process, a facilitator, (usually the facutly member), briefly introduces a patient. This introduction sets the scene for upcoming problems. The introduction should include the patient's age, medical diagnosis, physical setting, and the role of the nurse. The introduction is followed by a series of situations, for which the student must purpose some type of intervention.

The clinical situations can be used to target specific theoretical content or to stimulate general discussion of topics being presented. The facilitator prepares questions in advance of the group meeting. During the conference the patient is introduced and the questions are read aloud. The participants use the decision making model to brainstorm, compare alternatives and select optimal solutions. The facilitators role is to provide feedback and to encourage the students to think about why they are doing these interventions.

Another variation to this process is to have all participants contribute situations or questions for discussion. This approach will assure that the content discussed is at the level of the student. The process described not only provides students with simulated clinical experiences, but also facilitates peer evaluation. It appears to be an effective teaching/learning tool, and so far the response from students has been extremely positive.

COMPUTER ASSISTED INTERACTIVE VIDEO INSTRUCTION IN NURSING

In January, the presenters and John Ittelson, from the College of Communication Design, started working on a computer assisted interactive video instruction in nursing (CAIVIN) project. Interactive video is an excellent media for nursing. It combines the computer with video. In setting up critical incidents or case studies, it is important for students to pick up on subtle ques and physical findings. However, it is difficult to get students to discover these things in simulation without making it very obvious. With interactive video, subtle body movements and skin color changes can be shown and then the student can be evaluated on how well he/she discovers them. For the beginning student, hints can be given on what the student should be looking for and assessing. As the student gains experience and maturity, the hints/ques can be removed, challenging the advanced student. It can be set up so the student can activate it with little or no computer knowledge, or it can be set up to teach the student about the computer as well as the simulation.

While our goal is to do a series of CAIVI projects, the one in progress at this time is on decision making. It gives the student a scenario about an elderly woman who is three days post surgery and has developed difficulty breathing over the last several hours. The student is given several choices and given feedback on why her choices are or are not correct. Progression through the program is based on the ultimate selection of appropriate assessment and intervention strategies.

CASE STUDIES

Semester V is the last semester of the nursing program and, with few exceptions, the last semester before nursing students enter the work force. The students have two main emphasis in this semester; community health and integrated nursing. Integrated nursing is a capstone course which incorporates all of the student's past learning experiences. The syllabus for this class, contains 8-10 case studies in medical-surgical, maternal-child nursing. To date none of the case studies has a patient with the major diagnosis of a psychiatric disorder, but all of them have situational depression problems. Several of the case studies have chemical dependence and suicide problems involved with the medical, maternal, or pediatric problems. All case studies are real people and have multisystem involvement. For instance, there are diabetics with heart, eye, and kidney involvement, children with cerebral palsy, retarded, blind, and frequent seizure; a pregnant woman complications of pregnancy or diabetes. The case studies include history and physical, consultations, radiology, and laboratory findings.

Students are expected to come to seminar prepared to explain all the pathophysiologies involved, nursing care from hospital admission to community follow up, and laboratory and radiology results and implications. Social problems and ethical issues are also discussed. The faculty member acts as a facilitator and clarifier.

This one unit seminar is only part of this integrated nursing package. There is also a two unit clinical practicum. Students spend twelve hours a week for eight weeks in the hospital on the unit of their choice (if possible). The only units not allowed are the operating room and emergency room as these two areas do not have an integrated, long-term focus.

These courses are only in their third semester of existence. To date student evaluations are very positive. The students feel that the case study approach really pulls the entire nursing program together for them. They also feel it is an excellent review for the state board examination.

This presentation has covered a few of the things being done in the nursing program at CSU, Chico to get students more involved and active as participants in the learning process which will facilitate decision making in clinical practice. Most of these things are fairly new and as the faculty, and the students, gain more experience in these teaching methods, they will be refined and changed.

ON SOME POSSIBLE LINKS BETWEEN PERSONALITY THEORY, CULTURAL LEVELS OF ADAPTATION, AND CHRISTIAN THEOLOGY

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ON SOME POSSIBLE LINKS BETWEEN PERSONALITY THEORY, CULTURAL LEVELS OF ADAPTATION, AND CHRISTIAN THEOLOGY

Ralph G. O'Sullivan

The purpose of this paper is to link several sets of ideas in personality theory to each other and Christian theology, and then it links several sets of ideas in personality theory and Cultural Anthropology to each other and to Christian theology. The specific concerns addressed here include: (1) the writings on personality theory by Freud, James, Mead, and several Transactional Analysts seem linked to each other and to the Holy Trinity, (2) human adaptation similarities in Maslovian Psychology and the cultural functionalism of Malinowski, and (3) some possible Trinitarian foundations to Maslow's self-actualization theory and Malinowski's cultural levels of adaptation. While there has been no attempt to proselytize in this paper it is acknowledged that Christian theology seems to have permeated the social and behavioral sciences to a large extent, though social scientists have been differentially affected by such a theology.

ON SOME POSSIBLE LINKS BETWEEN PERSONALITY THEORY, CULTURAL LEVELS OF ADAPTATION, AND CHRISTIAN THEOLOGY

Ralph G. O'Sullivan

The purpose of this paper is to illustrate some apparent interactions which exist in several of the social or behavioral sciences and Christian theology. These thoughts suggest that some elements of personality theory and cultural levels of adaptation may be nearly identical, as well as the possibility that they are based in Trinitarian theology.

Three major topics are addressed. These concerns include: (1) the writings on personality theory by Freud, James, Mead, and several Transactional Analysts (T-A) seem linked to each other and to the Holy Trinity which defines God-in-man (the *Son*, or Jesus), God as a social conscience (*Father*), and God a moral conscience (*Holy Spirit*), (2) human adaptation similarities in Maslovian Psychology and the anthropological Functionalism of Malinowski, and (3) some possible Trinitarian foundations to Maslow's *self-actualization* theory and Malinowski's cultural levels of adaptation.

Freud's *id*, James' *materal me*, Mead's *I*, and Transactional Analysis' *child ego state* all define the biological, drive-related, and social development properties of personalities or social selves. The self, then, is uniquely personal, natural, and capable of social development. Such personality elements could have been founded in Christianity's definition of God-in-man wherein Christ was a biological and social man. Freud's *ego*, James' *social me*, Mead's *me*, and T-A's *adult ego state* relate to the social maturity of people, just as God's social mores were transmitted through God-as-*Father*, or God as agent of socialization. Freud's *superego*, James' *spiritual me*, Mead's *generalized other*, and T-A's *parent ego state* all detail the cultural, moral, normative, and possibly spiritual aspect of a personality structure, just as God has been described as being a transcendant Holy Spirit.

Maslow's Hierarchy of Needs theory has here been collapsed into just three strata. Maslow's biological needs (here defined) describe personal actions to protect oneself from the environment and to maintain life, just as Malinowski's basic needs describe such activities but for collectivities of people. Maslow's social integration (here defined) illustrates the socialization activities of people as Malinowski's derived needs detail the need for socialization to occur and the necessity for social control in groups. Maslow's self-actualization, referring to pinnacles of personal experience or vision quests, seems to be a micro-level description of Malinowski's integrative needs which define collective cognitive experiences which transcend the commonplace.

Maslow's biological needs and Malinowski's basic needs define mankind as being biological and adaptive in much the same way that Trinitarian theology has described God as manifested in biological man who, necessarily, had to adapt to both physical and social environments. Maslow's social integration and Malinowski's derived needs define mankind as being social, capable of collective interaction, and in need of socialization by parents, as Christ, or God-as-Father, was such a socializing agent. Maslow's self-actualization and Malinowski's integrative needs define individual and collective experiences beyond-the-commonplace as God-as-Holy Spirit is often interpreted as being the ultimate experience in human social life.

This paper is not an attempt to proselytize. Rather it is an effort to illustrate how various social phenomena are not the domain of any partiocular social or behavioral science or theology.

ON SOME POSSIBLE LINKS BETWEEN PERSONALITY THEORY, CULTURAL LEVELS OF ADAPTATION, AND CHRISTIAN THEOLOGY

Introduction

A number of years have now passed since I first enrolled in a basic Sociology class as an undergraduate student. At the time the class was taken by me solely because another class had been cancelled so I was obliged to take an alternate course in order to receive my full monthly allotment of "G.I. Bill" educational benefits. I became attracted to Sociology and to the other social or behavioral sciences because of their diverse subtopics, by their approaches to them, by their overall social concerns and humanitarianism, and because of their analyses of then-current events in the late 1960's and early 1970's.

Before I took the basic Sociology class, though, I had taken a basic Anthropology class. It, too, was fun, informative, and challenging. When I finally decided to become a Sociology major I also paid special attention to Social Psychology and to Anthropology. After receiving my master's degree I accepted my first teaching assignment.

As a new Sociologist and as a novice teacher I undoubtredly tried to lecture my students in everything I had learned about Sociology and several of its sister sciences. I now feel as if I asked my students to memorize every term and name that are familiar and commonly used by us all. My students, then, became well-versed in "buzz-word" or "vocab-word" Sociology while they were likely to have been ill-prepared to evaluate ideas, to interpret data, and they were probably not prepared to intergrate information into meaningful "wholes" for themselves. Changes in teaching style have since occurred in my classes.

Over the past several years I have been offered the opportunities to teach on cross-discipline bases for several schools. In these job assignments I have taught Anthropology, Social Psychology, Psychology, as well as a wide range of Sociology classes. The purpose of this paper, then, is to share some ideas that have germinated in discussions with collegues, in dialogues with students, and in preparation for classroom discussion. The reader needs to be cautioned, though, because the following thoughts have not been molded into sophisticated theoretical models; they have not been assessed with statistical rigor; and a new sociological paradigm is not being presented. Rather, these presentations are attempts to understand how some aspects of personality theory, cultural levels of adaptation, and Christian theology seem linked together, thus making for fascinating classroom discussions and for fostering a cross-disciplined intellectual imagination.

Some Ideas to Share

The information which is presented here is known to us and is often used in standard textbooks and other forms of literature. There are, then, three major topics which will be addressed in the following portions of this paper. These topics include: (1) tripartite components of personality structures and their apparent links with Christian theology and its triunal diety, (2) some apparent interaction between Maslovian Psychology and the Functionalism in Malinowski's Anthropology, and (3) some possible foundations from Christian theology in Maslow's self-actualization theory and Malionowski's three tiers of cultural adaptation needs. These discussions now follow.

Personality structures

Though I am not a formally-trained Psychologist I have frequently been invited to teach classes in basic Psychology, sociologically-based Social Psychology, and psychologically-founded Social Psychology. My sociological background has aided me in developing some insights into academic Psychology, but I also acknowledge various limitations in classroom presentations and in psychological orientations because of my training. However, because I have taught Psychology classes so often I now feel hard-pressed to define myself as being a "pure" Sociologist.

Be that as it may, the subject of personality development is a concern of Sociologists, Social Psychologists, Psychologists, and Cultural Anthropologists. All of these academic specialists use various sets of assumptions in order to identify the process by which people become capable of social interaction. In my Psychology classes, in my Social Psychology classes, and in my Sociology classes I discuss the parallel, or at least roughly equivalent, terminologies which are often used to describe the tri-ordered dimensions of personalities or social selves.

Personalities or social selves are complex and sometimes delicate phenomena, and the attempts that have been made to detail their ideal elements sometimes promote quick and heated debates. Yet, the literature of the social and behavioral sciences is endowed with a plethora of described personality traits or idealized personality structures. It is the task here to briefly review some of these theories, to reveal their common features, and then cautiously speculate that some human behavior analysts may have learned a religious theology very well.

Sigmund Freud wrote for us that personality structures have three major "psychic forces" or components to them (Fernald and Fernald, 398 - 400). The id consists of a person's in-born or drive-related impulses which can become socially-created selfishness and irrationality. The ego identifies the rational and decision making component of the personality which has the responsibility of mediating between the id and the superego, as well as weighing alternative courses of action. The Freudian superego refers to the collective set of normative structures that societies create which make social order possible. The superego is made manifest in "thou can ..." and "thou shall not ..." kinds of dicta, all of which provide guidelines for human interactive behaviors.

William James also proposed that personalities or selves have three dimensions to them. James' material me refers to the bodily self, to the cognitive self, and to the self as the basis for property ownership which is a particularly personal phenomenon. The social me defines an individual's ability to take other people into account because this dimension refers to the propensity and the need to evaluate social statuses so that social placement can be determined. Though the spiritual me may be difficult to understand by itself (Phelan, 230) it is considered to be the composite of all a community's attitudes and values (Phelan, 230), and, just perhaps, the community's orientations to the cosmos and creation. Accordingly, the spiritual me can also refer to supernormative and religous values which define cooperation and social or religous mores.

George Herbert Mead, considered to be the "Father" of modern Symbolic Interactionism was strongly affected by the scholarship of James (Coser, 333) with whom Mead held a close philosophical affinity (Meltzer, 7 - 9), as well as being affected by the writing of Freud (Schellenberg, 37). According to Meadian teachings an individual's self or personality is composed of three components, being identified as the I, the me, and the generalized other. The I refers to the spontaneous and basically selfish behaviors that are bereft of significant social control, somewhat analogous to Freud's id. The me is developed through the socialization process, and it is particularly social in nature because it allows an individual to define social statuses and evaluate possible courses of action and their possible consequences and social sanctions.

The *genralized other* is "an integrated conception of attitudes, norms, values, and beliefs of one's community" (Shepard, 150). In a sense the *generalized other* is synonymous with Freud's *superego* and with James' *spiritual me*, as well as with the concept of "culture" as it is the composite normative and cognitive dimesions of a people which define how people should behave and think, all of which need to be internalized by everyone if society is possible.

Several founders of Transactional Analysis (T-A) such as Berne (1967 and 1977) and Harris (1969) have taken a neo-Freudian stance in their contributions to our understanding of human behavior as they, too, have informed us that an individual has three *ego states*. Like Freud's *id* Transactional Analysis' *child ego state* if often selfish, hedonistic, and it may be the basis for social action in which there is little concern for other people. Transactional Analysts' *adult ego state*, like Mead's *me*, is a personal guiding force which allows an individual to make rational behavioral choices or take others into account when planning behavior. The *parent ego state* of Transactional Analysis, too, is supernornative and acts as a moral guide to social life.

These brief discussions are not intended to exhaust the entirety of defitions that we use in our discussions of personality and its development. Other orientations are in abundance. Also, the kinds of terminologies presented here are used for definitional purposes only, suggesting that personalities are multifaceted being affected differently by biology and specific environmental stimuli or social cues. These discussions are, however ones which I use with a great deal of regularity in my classes as you may have used them, too. Their usages here, though, are intended as bases to discuss some of their similarities and they are then used to launch speculation about their theological foundation.

Freud's *id*, James' *material me*, Mead's *I*, and Transactional Analysts' *child ego state* have common themes to them. Here, the personality or self requires the satisfaction of biological drives and certain socially-created needs. The self is biolgical and social. An individual is often guided by the reduction of discomfort or the pursuit of pleasure. Actions are sometimes spontaneous. This dimension of the self is the basis for social _action_.

Freud's _ego_, James' _social me_, Mead's _me_, and Transactional Analysis' _adult ego state_, likewise, contain common thoughts. In these perspectives the self can be rational and calculating. The self is considered to have reached a modicum of personal and social "maturity." The self may be mindful of the needs of others. The self is the basic unit of social _interaction_, too.

Freud's _superego_, James' _spiritual me_, Mead's _generalized other_, and the _parent ego state_ of Transactional Analysis all refer to an element of a personality or a community which is beyond mere personal or collective life. These terms refer to the cognitive and normative domensions of social life which transcend identifiable experiences or individual autonomy of action. With some caution we might suggest this dimesion of life was created in history and continues beyond an individual's life span, though its specific content or definition is apt to be interpreted differently over time by various groups of people.

In my lower-division classes I concern myself with the biographies of scholars only superifcially, so I am not in a satisfactory position to effectively estimate the true depth of some writers' religous experiences. Nonetheless it is commonly understood that Freud was Jewish and vehemently anti-Christian though his letters suggest that religion is important to psychoanalysis (Jones, 352). Likewise, Maslow was Jewish as is Berne. Mead, in contrast was raised in a strict religous atmosphere. I do not know of any religious affiliation for James. In Harris' book (227) there is a suggestion that he is Christian, or at least well-versed in its theology. So, it is interesting to note how these writers' ideas were similar to each other, though the writers were raised in diverse socio-intellectual environments and eras. An individual, however, does not have to adhere to a set of ideas, philosophies, or theologies in order to be affected by them. The thoughts that have just been presented here are interpreted as being remarkably similar to the Christian theology of the Holy Trinity which is composed of God-as-Son, God-as-Father, and God-as-Holy Spirit.

God-as-Son defines God as made manifest in a man, Christ, who was born of a woman with normal biological drives and developed social needs that had to have been met, thus God-as-Son is a definition similar to Freud's id, James' material me, Mead's I, and T-A's child ego state. God-as-Father identifies God as being a mature and socially-responsible authority figure and agent of socialization in the lives of men, in much the same way that Transactional Analysis' adult ego state epitomizes rationality and concern for other people. God-as-Holy Spirit identifies God as being a supernatural and supernormative reality genitor of all life, offered freely to mankind, and who provided people with a series of guides or mores to govern human behavior. This dimension of the Holy Trinity parallels Freud's superego, Mead's generalized other, and other ideas that have been discussed in these pages. All of these concepts or thoughts are summarized for the reader's convenience in Figure 1.

Regardless of which particular theory or religion an individual defines himself or herself as being an advocate, one salient feature of all of these ideas is present. An individual's personality or social self is a complex phenomenon, and its different dimensions are made manifest at different stages of the life cycle and as the result of interaction with diverse environmental

Figure 1

Common Themes in Personality Theory and Christian Theology

	Proponents				
Personality Trait	Freud	James	Mead	T-A	Christian Theology
Man is biological. Man strives to sustain life. Man adapts to physical environments. Man is basis of social action.	*id*	*material me*	*I*	*child ego state*	God-as-Son
Man is social. Man creates cultural environments. Man is normative. Man is basis for social interaction. Man is mature.	*ego*	*social me*	*me*	*adult ego state*	God-as-Father
Transcendant values and norms affect social life. Man adapts to transcendancy. Man is moral.	*superego*	*spiritual me*	*generalized other*	*parent ego state*	God-as-Holy Spirit

variables. It should come as no surprise, then, that one of the earliest attempts to understand the full and complete nature of humans is based on a religious doctrine that has permeated Western civilization and Western thought for nearly two thousand years.

These are preliminary statements, and they are often used to provoke discussions with my students. However, if our task as teaching sociologists includes helping students to think critically and analytically, and assisting students in their personal and academic quests to expand their intellectual horizons, then, just perhaps, these types of discussions which interface social and behavioral sciences with analyses of religion may serve as stimuli in the completion of our tasks.

Maslow and Malinowski

Introduction to Psychology classes, and social psychology classes, and their appropriate texts, frequently and almost universally address the concept of motivation in terms of biological and emotional needs which must be satisfied to insure personal survival, comfort, and satisfaction. Sometimes we suggest that motivation is biologically determined and at other times we inform our followers that motivation is also partially the product of learned experiences. Regardless of which stance is taken, biological determinism or learning determinism, or if they are integrated into some eclectic whole, the contributions of Abraham Maslow shed some light on our discussions.

Maslow, as related in many texts, informs us that there is a motivational Hierarchy of Needs to be satisfied in every person. Some texts define seven such levels of needs (Hilgard, et al., 316) and other texts describe five levels of needs, as are illustrated in Figure 2. For purposes of ease here the position of five strata offered by Fernald and Fernald (357) will be used.

Physiological needs refer to the ingestion of nutritional foods and beverages, rest, relaxation, maintenance of a constant food supply, elimanation of bodily waste, and so on, in order to maintain biological homeostasis. Safety needs illustrate those requirements of protection from danger or the vagaries of physical environments. Love and belonging needs refer to the emotional and physiological intimacies of human interaction. Self esteem refers to information given to us that we are worthy people and that others like us. Self-actualization (S-A) describes the realization of personal potential, the willingness to accept new challenges, and the understanding that human social life can have a variety of peak experiences (VanderZanden, 132 - 133).

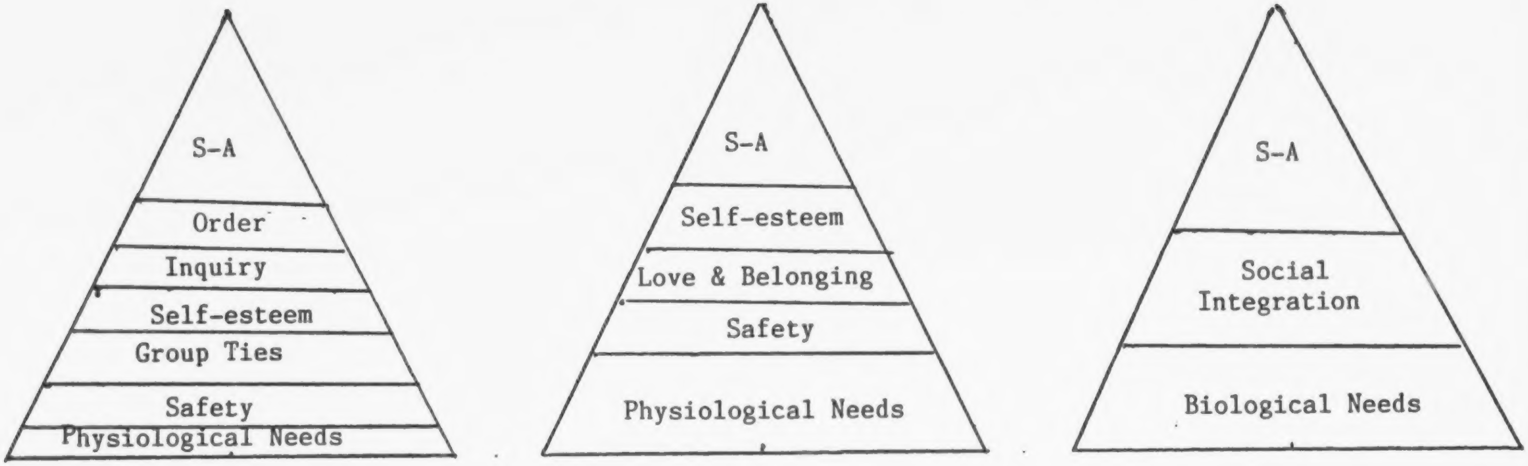
I do not intend to discuss the validity of efficacy of this theory. Rather, I want to relate to the reader how I have further refined the theory for simplicity in classroom discussions, then I will suggest that the writings of Maslow seem to be directly related to the scholarship of Bronislaw Malinowski and, maybe, to Christian theology.

In my psychology and social psychology classes I collapse the five levels of needs into just three strata, as are illustrated in Figure 2. In this format biological survival identifies those kinds of work activities in which people must engage in order to sustain life and adapt to physical environments. Social integration describes the collective set of needs for close and intimate personal relations, the needs for social norms and their appropriate sanctions, the need to be socialized by those already socialized, as well as the giving and the receiving of social esteem. Self-actualization remains as defined, although a "self-actualized" person need not be a "mover and a shaker."

Though some of my readers or my students may level the criticism that I have engaged in too much reductionism, I disagree. The tenets of the theory

Figure 2

Three Approaches Used in Discussing Maslow's Hierarchy of Needs Theory


S-A
Order
Inquiry
Self-esteem
Group Ties
Safety
Physiological Needs
S-A
Self-esteem
Love & Belonging
Safety
Physiological Needs
S-A
Social Integration
Biological Needs

after Hilgard, et al. (316) after Fernald & Fernald (307) O'Sullivan have been maintained without being too strongly inclined to adhere to "buzz word" psychology. Besides, if we pay close attention to the content of the theory instead of some of its specificity we can illustrate that his aspect of Maslow's psychology is similar to the anthropology of Malinowski.

Again, I have to admit that the biography of Maslow, as well as the personal data concerning Malinowski, is not known to me, and I do not ken whether or not Maslow had every read the work of this Anthropologist. Yet, certain discussions in Maslovian psychology seem to be micro-level analyses of Malinowski's societal prerequisites.

In my sociology and anthropology classes I define the concept of "culture" as a problem-solving activity, which then leads into discussions of such survival problems as food-getting activities, socialization, social control, regulation of adult sexual activity, symbolic communication, and so on, as primary concerns of collectivities of people. In class, these discussions are then followed with additional comments describing the core social institutions as mechanisms by which these problems are solved, but such discussions need not be addressed here.

In her textbook entitled Cultural Anthropology Nanda (23 - 29) discusses several theoretical approaches that are used both academically and as bases for research in cultural anthropology. In that text (29) she writes that Bronislaw Malinowksi (known for his work among the Trobriand islanders) was one of the founding fathers of the Functionalist approach, which partially defines "culture" as being artificially created to solve the survival needs of collectivities of people. Lacking instincts, then, culture is a surrogate survival mechanism.

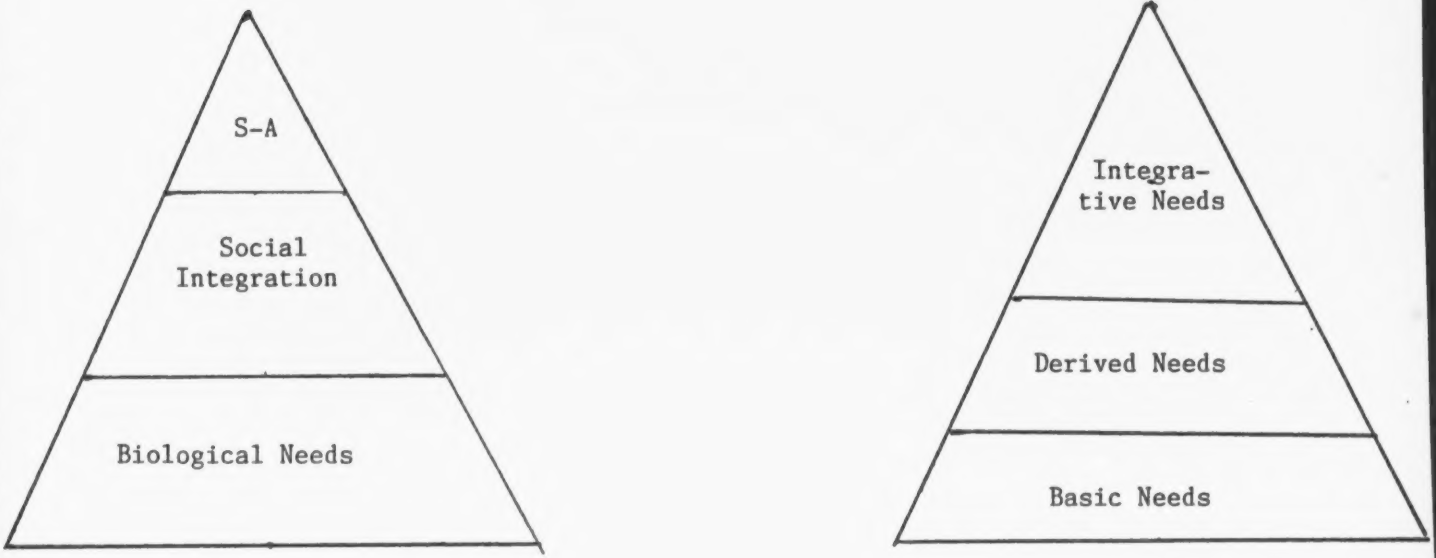
In this framework Malinowski's basic needs define the requirements of adaptation to physical environments, the provision of food, the making of shelters, and the establishment of a satisfactory division of labor in order to assure that all work tasks will be completed successfully. Derived needs identify problems related to social integration such as the establishment of symbolic communication systems, normative structures for social control, social respect for others, and the maintenance of primary relationships. Malinowski's integrative needs provide people with meaning to life and an understanding of the human condition and ultimate social purpose.

While Malinowski's contributions to our understanding of human social life concern themselves with the meeting of collectivities of peoples needs, it seems that these priorities parallel, almost perfectly as is shown in Figure 3, a three-tiered interpretation of Maslow's Hierarchy of Needs theory. Malinowski's basic needs and Maslow's biological survival needs (here defined) describe the necessities for communities and individuals, alike, to adapt to natural environments, to work, and to insure collective survival and individual longevity. Malinowski's derived needs seem to be built into Maslow's social integration (here defined), though at different levels analyses yet referring to adaptation to social environments. If Malinowski's integrative needs define purpose in life, then Maslow's self-actualization serves the same function since actualization refers to the abilities of some people to have new experiences, to face challenges novelly, to redefine purpose in life, and to strive for some pinnacle of personal development which transcends the commonplace or the

If I have been too liberal with these sets of ideas, or if I have forced one theory to fit another I offer my apologies. In my classes I try to deal with discovery learning in addition to programmed learning. I try to relate sets of ideas with each other, when appropriate, and this was my task here. All institututions, all groups of people, all formal organizations, and all people must adapt to certain physical and social environments, and the works

Figure 3

Comparison of Maslow's Theory with Malinowski's Ideas


S-A
Social Integration
Biological Needs
Integrative Needs
Derived Needs
Basic Needs

Maslow

Malinowski

Maslow and Malinowski define how such adaptation occurs.

Maslow, Malinowski, and Christian Theology

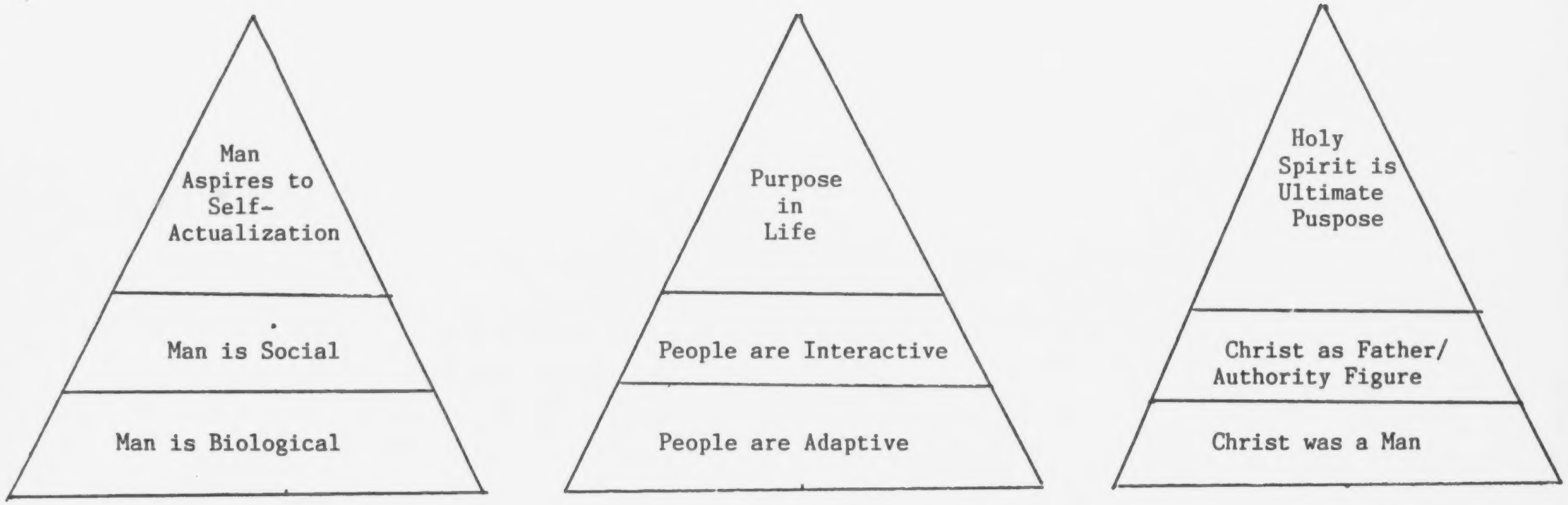
A previous section of this paper posited the notion that some dimensions of personality theory may have been strongly affected by the dominance of Christian theology in Western civilization, even though the behavioral theorists, themselves, may not have personally expressed such outlooks on life. This portion of the paper expands upon such discussions to allude that both Maslow's ideas and the writings of Malinowski may have been similarly affected by the triunal God of Christianity. Figure 4 summarizes these discussions.

In Maslovian psychology an individual necessarily must adapt to the natural world in order to survive. Thus, an individual is uniquely biological in much the same way that Christianity partially defines God-as-Son, in Christ, adapting to his physical surroundings in the Near East. Maslovian psychology also informs us that all people need to have their social statuses defined, that we should take others into account when planning courses of action, and that all people are capable of being mature and able to make "sense" of their social environments. Christian theology defined God-as-Father in terms of his social responsibility for fellow man. Finally, Maslovian psychology tells us that people are capable of reaching for, and possibly attaining, self-actualization, resulting in inner peace and personal satisfaction. Christian theology holds that people are enjoined to strive to become ultimately graceful with God-as-Holy Spirit, wherein we are in accord with God, with our fellow man, and with ourselves.

In a similar manner Malinowski's three levels of cultural integration may have been so founded. All people must adapt to the world, or die, his basic needs. God-as-Son was born, was socialized in rabbinic Judaism, and

Figure 4

Common Components of Maslovian Psychology, Malinowski's Anthropology, and Christian Theology


Man Aspires to Self-Actualization
Man is Social
Man is Biological
Purpose in Life
People are Interactive
People are Adaptive
Holy Spirit is Ultimate Puspose
Christ as Father/ Authority Figure
Christ was a Man

after Maslow

after Malinowski

Christian Theology

died, as happens to all men and women. Collectivities of people also require guidelines for behavior and socialization to occur in order to maintain social order and keep society intact, thus Malinowski's derived needs. God-as-Father was an agent of socialization who instructed people about how they should arrange their lives in accord with social mores, law, and a general concern for the rights and sanctity of others. As with Maslow's self-actualization, Malinowski's integrative needs define the necessity for definition of purpose in life, symbolic or artistic expression, and transcendance of the mundane. God-as-Holy Spirit, with whom people are asked to align themselves, manifests a similar transcendance in expectation of a perfect, and greater life to come.

To suggest, then, that both Maslow's Hierarchy of Needs theory and Malinowski's three levels of cultural adaptation may be severely related to Christian theolgy is certainly an intellectual challenge, though not an improbable or a specious one. Maslow's and Malinowski's ideas, like those concerning other aspects of personality theory, relate to us that individual people and collectivities of people are multi-faceted. Man, or men, are neither biological alone, nor social alone, as they are not normative, alone. Rather, both individuals and groups have different dimensions about them which become manifest or apparent under different sets of social and natural variables. The biological dimension of people, the social dimension of people, and James's spiritual me components of humans are, necessarily interactive.

Christian theology, likewise, avers that individual people and groups of people are similarly composed. This theology emplors its people to: take adequate and proper physical care of themselves, to interact with others courteously and in accord with implicit or explicit norms, and to believe in somethink for which to strive, that is, a spiritual and personal peace with God-as-Holy Spirit.

It has not been the purpose of this paper to proselytize. Rather the purpose here has been to share with the reader how some dimensions of personality theory are almost identical, and, seemingly, related to a theology which has greatly influenced Western civilization for nearly two thousand years. A second concern of the paper was to identify how, according to some aspects of psychology and anthropology, individuals and groups of people are obliged to adapt, similarly, to differnt kinds of natural and social variables in order to assure individual and collective survival. Finally, the concluding portion of the paper inferred that Maslow's dominant theory of personality and Malinowski's contributions to our understanding of culture are, again, nearly identical but deal with different levels of analysis, may have been affected by the same theology which seems to have affected our understanding of personality development.

Conclusion

For social and behavioral scientists there is an explicit need to appreciate the concerns and the domains of our specific disciplines, as well as there being a need to accept the contributions made by scholars and scientists in other disciplines. Personality theory, for example, is not the sole domain of psychology because Sociologists, Anhropologists, and Social Psychologists have all shed some light on the processes by which people become capable of social interaction and social responsibility. Likewise, a prevalent theology in Western civilization has had is maifest or latent effects on the lives of various social scientists.

We should not, then, accept the notion that human social life can be divided according to the tenets of each of the dominant social or behavioral sciences or religion, alone. When we review the contributions that each discipline or theology has made we can further appreciate the richness, the potential, and

and the complexity of society as we try to instill such an understanding in our students, too.

Selected References

Berne, E. 1967. Games People Play: The Psychology of Human Relationships. New York: Grove Press.

1977. Intuition and Ego States: The Origins of Transactional Analysis. San Francisco: Harper and Row.

Coser, L.A. 1977. Masters of Sociological Thought (2d ed.). New York: MacMillan Publishing Co.

Fernald, L.D. and P.S. Fernald. 1985. Introduction to Psychology (5th ed.). Dubuque, Iowa: Wm. Brown, Publisher.

Harris, T.A. 1969. I'm OK - Your're OK. New York: Harper and Row.

Hilgard, E.R., R.L. Atkinson, and R.C. Atkinson. 1979. Introduction to Psychology (7th ed.). New York: Harcourt Brace Jovanovich.

Holt, R.P. 1968. Freud, Sigmund. In D.C. Sills (Ed.) The International Encypedia of the Social Sciences. New York: The MacMillan Free Press Co.

Jones, E.J. 1957. The Life and Work of Sigmund Freud (Vol. 3). New York: Basic Books.

Maslow, A.H. 1970. Motivation and Personality (2d ed.). New York: Harper and Row.

Meltzer, B.N. 1959. The Social Psychology of George Herbert Mead. Kalamazoo, MI: Division of Field Services, Western Michigan University.

Murray, E.G. 1964. Motivation and Learning. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Nanda, S. 1980. Cultural Anthropology. New York: D. VanNostrand Company.

O'Sullivan, R.G. 1986. Professing social science: selected notes on teaching from an interdisciplinary perspective. Paper presented at the 1986 annual meeting of the Midwest Sociological Society. DesMoines, Iowa.

Phelan, W.D. 1968. James, William. In D.C. Sills (Ed.) The International Encyclopedia of the Social Sciences. New York: The MacMillan Free Press Co.

Schellenberg, J.A. 1978. Masters of Social Psychology. New York: Oxford Univesity Press.

Shepard, J.M. 1984. Sociology (2d ed.). St. Paul, Minn.: West Publishing Co.

VanderZanden, J.W. 1984. Social Psychology (#d ed.). New York: Random House.

1986. Sociology: The Core. New York: Alfred Knopf, Inc.

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A COURSE IN THINKING FOR INTERDISCIPLINARY FACULTY GROUPS

(Paper presented at ISII 1986: Thinking Across the Disciplinary Conference, Atlanta, GA--October 9-11, 1986.)

This article is derived from one seminar on Thinking & Communicating created by and for faculty at Pace University in New York.(1) Faculty meet for two hours per week. They apply the topics to their own disciplines and also prepare to teach the subject as a whole under the heading of critical thinking. Enthusiastically, they suggested our materials and procedures might be of value to groups outside the university.

The Map is Not the Territory

An obsolete street map can mislead a visitor to a city. Streets might have been re-named, re-routed, made inaccessible or even obliterated as the city changed. Language, like a map that ignores a changing reality, can make us believe in certainty that doesn't exist. However, we can take precautions against its false promises of security.

In this seminar, we usually start with a concrete demonstration, followed by a discussion and practice exercises. To remind a class to think of language as a map _of_ something else, or as a code _for_ something else, I present the riddle:

> "Whatever I say something is, it is not."

If the class doesn't perceive the riddle's meaning, I underline the word "say." Whatever I _say_ about something is not the same as the something itself. The map is not the territory.

If some people still miss the point, I ask the class to close their eyes. I crumple a piece of paper and ask, "What did you _hear_?" Usually someone says, "I heard a paper crumpling, "to which I reply, "Did anyone hear the words 'paper crumpling'?" No one did. If they are still mystified, I take a piece of white chalk and write on the board "Green." I ask, "What color is that?" Some reply it's green, others that it is white. Most now recognize the crucial difference between the word "green" and the non-verbal experience of white. To clinch the point, I write the word "water" on the board and ask if anyone can drink it. No one can.

Two Worlds: Verbal and Non-verbal

Thus we emphasize the easily forgotten truth of two worlds: one is the non-verbal world that we observe with our senses and various other instruments. The other is the world of symbols with which we map or codify what we observe. Although we can symbolize with numbers or pictures, more often we use language. Although we realize that words are not the things they represent, often we do not realize how poorly our verbal maps fit the territories we're talking about. During the course on thinking & communicating, we work at finding better matches between what we observe and what we say. Such efforts may be vital to accuracy, and accuracy may sometimes be vital to human welfare.

The short test below illustrates some important points.

Instructions: Below are some statements-- some generalizations about what people have observed. Mark each one TRUE; or, if it is not always true, mark it FALSE.

____1. Apples are red.

____2. Milk is good for people.

____3. One and one make two.

____4. The speed of sound is 741.5 miles per hour.

____5. AIDS causes death

____6. Reagan is a Republican.

Even some of the most sophisticated college professors will mark one or more of the above sentences as TRUE. All items should be marked FALSE, however, for reasons to follow.

One reason people get some answers "wrong" is that they misperceive the directions. The instructions said an item should be called FALSE if it is not always TRUE--an unusual definition of the word "false." From our many years of true-false tests in school we have been programmed to believe a thing is either true or false. Thus, the mere sight of the words can trigger our laying the old map upon a new territory.

The World of Process

Another reason for error is that we can be fooled by the structure of the language. The words come across as authoritative; as factual, definite and final. But nothing in nature is totally factual, much less final. What goes on in the non-verbal world are ever-changing processes, phenomena that don't stand still. Our static language as a map doesn't fit non-verbal goings on. For example, apples are not always red; they may be green or yellow. More important, any given apple, if examined closely, will reveal several colors. Furthermore, even as we hold one under observation it changes color, becoming ever so slightly more brown. Eventually it will turn mostly brown and then black. The color of apples all depends upon---.

Milk is milk you say? What is called milk may be raw or pasteurized, containing small to lethal amounts of bacteria. If it is derived from cows, it might contain enough fat to grow a calf but bloat a baby. Mother's milk could contain immunizing agents while powdered milk could lack vitamins or contain harmful hormones. What kind of milk are we talking about? For what kind of people is it intended?

Do one and one make two? Always? Yes, but only by definition in the symbolic world of arithmetic. However, mixing one unit of alcohol with one unit of water results in something less than two units. In nature, substances when combined may mix, evaporate, synergize, turn into gas, or even explode. What, for example, would one stick of dynamite plus one lighted cigarette equal? It could be vital to know that one jigger of alcohol plus one tranquilizer might result in one driver asleep at the wheel.

Being aware that changes are not necessarily additive can keep us alert to possible disaster. For example, just one more critical remark to a spouse can trigger her act of violence. One less dessert in the prison cafeteria can be the last straw preceding a riot. One degree of warming the earth's atmosphere could flood whole geographic areas. On the positive side, one more illustration might cause a student to reorganize a thought pattern. One more effort might turn a skeptic into an ally. Adding just one more person to an organization might change the whole group's morale.

Well, you might say, the speed of sound has been known to be 741.5 miles per hour for decades. It's a scientifically accepted fact, isn't it? Yes, at least it was considered a fact until this year(2) when George Wong discovered the figure to be (for now) 741.1 miles per hour. A difference that matters? Not to most people. But the difference could be crucial to submarine warfare or to the engineering of aeroplanes.

We must remember that scientific formulations, equations, facts belong to the world of maps, codes and symbols. At a symbolic level, they may be repeated until they seem absolutely true. At the non-verbal level, however, scientists are much less sure about what is absolutely true. Habitually, they pursue the fine tuning of all standards. First, they know that measurements are rarely, if ever, identical. There are too many variations in observers, in the observing instruments, and in the things observed. Some things change just by virtue of being observed. We know that equations about the speed or size of anything represent averages and generalizations about wide variations in nature. Sound speed changes with the direction of the wind; heat and humidity can make a difference. Secondly, instruments of observation keep developing. Newton's calculations were wrong by 15%; he did not have such finely calibrated instruments as scientists have today.

Whether we use the word AIDS (or any other disease word) as one thing or as a changing process can make an enormous difference in personal hope, community attitudes and government efforts. Our best information so far (3) indicates that AIDS appears to behave differently in different persons and even in different countries. Fast moving research may change definitions of symptoms, treatment measures, and ultimately prospects for cure.

Surely, however, we can say that Ronald Reagan is a Republican. Right? Yes, but is it the truth, the whole truth, and nothing but the truth? At one time he said he was a registered Democrat. Could he now be in the process of becoming something else again? What do we mean by Republican? Does a person have to believe in every plank of the platform to be a Republican? If not, then how many planks of the party can he disagree with without losing his category? Are the planks of the party the same in 1986 as in 1956 or in 1886? How is Republicanism changing over time?

How is Ronald Reagan changing? Might there be some political figures other than Republicans whom he'd favor and even vote for? Can we even be absolutely sure that Reagan voted for himself in the last election? The point is to be aware that any important figure may be changing in crucial ways. For example, Edmund P. Wilson, once an intelligence agent, changed into a rogue selling arms to enemies. People's political beliefs and moral values, while usually stable and predictable, can change gradually or even radically. One needs only to examine one's own history to see examples.

Subject-Predicate Language: Need for Vigilance

Let's say we have acknowledged that the six statements above are not always true. What about the six or sixteen thousand others that could be listed? No one can be expected to have enough knowledge to perceive all the possible exceptions to each one. There must be a general point to all this that can be useful to any literate person.

The secret lies in recognizing what statements like the above have in common. Notice that the structure of each sentence follows a pattern: a subject followed by a predicate. Milk is---. Apples are---. One and one make---. Reagan is---. AIDS causes---. What we need is to develop the habit of red-flagging such structures. We must remember the general principle that whereas nouns like apple, Reagan and milk seem like static phenomena, what they refer to non-verbally cannot be static. Static nouns are misleading maps of territories that have, are and will be changing. Therefore, we know that what nouns are, have, or do won't stand still either. Immediately, we can adopt a skeptical stance whenever confronted by subject-predicate structures. We can then ask appropriate questions such as: When? Where? According to whom? As measured by what or whom? For whom? In what circumstances? What do they mean by? In other words, the noun-predicate structure, to be a good map of a changing territory, must be modified to reveal the dynamic variables of who, what, where, when and in what context.

If this principle of remembering that things keep changing is important to accuracy in thinking or communicating about milk or apples, it is even more important when dealing with emotionally laden or highly abstract subjects. For example, consider such words as freedom, communism, terrorist, government official, Libya, capitalism, the New York Times, fundamentalist, etc. Our "languaging" them in nouns makes them seem like static things, stereotypes even. Yet each one could have multiple meanings, depending upon who uses them in what time, place and context.

The noun "freedom", if perceived as a thing, could be falsely interpreted as something people either have or don't have. Some countries seem to have freedom while others have none at all. Adolescents can drug themselves to death in their fight for freedom from parents whom they think give them no freedom. Freedom should be seen as a word reflecting many variables and many shades of meaning. Relevant questions would be: What do you and they mean by it? Freedom for whom to do what, when, how, in what circumstances? How much freedom should an 8 year old have in a classroom, a theater, in the privacy of her own bedroom? To what extent can a government protect the freedom of business leaders to maximize profits while protecting the population's right to freedom from toxic wastes?

Take a sentence like, "Productivity improvement means lowering costs and increasing labor's output." The sentence sounds authoritative, logical and sensible. But the subject-predicate structure ("Productivity improvement means...") puts us on the alert. At the non-verbal level, the subject of productivity won't stand still long enough for us to take a snap-shot and offer a static picture. In fact, paradoxically, according to a Harvard Business Review article(4) we find that lowering costs and badgering employees to produce more is not only least effective but also vulnerable to back-lash. Apparently, spending more for modern equipment, a better location and more innovative managers works better.

Antiodotes for Misleading Maps

In our course, we ask the faculty to go through the motions of changing subject-predicate generalizations to fit what they realize is a changing reality. For example, you might now want to practice modifying the six sentences above. How many ways can you re-phrase "Apples are red," using the questions: According to whom? Which one? When? As measured by? In what context? etc. Now try the word "terrorist." Without practicing such modifications, tedious though they may be, we can easily remain lulled into believing the world is just like our obsolete maps.

Some people object that others don't like writing that contains qualifications. They say people prefer to know exactly what's what with no waffling. To this objection I answer that if people prefer a false sense of security, they may prefer even less to be misled by predictions that fail. Of course, when speaking of apples, multiple qualifications may be a deadly bore. The point, however, is to recognize when accuracy is important. We must not arbitrarily accept or reject the words of a politician, priest or knave. Nouns and categories refer to events that may be neither permanent nor reliable. Knowing the specifics through asking questions improves the match between map and territory.

Summary

This article reflects one session of a course in Thinking & Communicating for Pace University faculty, a course adaptable for many other groups.

The purpose is to heighten awareness that language can seriously misrepresent the events which it describes.

Recognizing subject-predicate structures can alert us to the need for asking such questions as: According to whom? Which one? Where? At what time? In what context? etc.

FOOTNOTES

(1) The Thinking & Learning Center of Pace University is endowed by Robert K. Straus in memory of J.S. Bois, A. Korzybski, J. Piaget, F.J. Roethlisberger, and Sir A. Zimmern to further students' awareness of how they perceive, evaluate and make decisions day to day. Subject matter is based upon a Roots of Knowledge approach to critical thinking. Many formulations derive from epistemics and general semantics.

(2) Gleick, James, "Scientist Corrects an Old Error on Hallowed Speed of Sound." The New York Times, 24 June, 1986, p. C1

(3) Rowe, Mary P., Malcolm Russel-Einhorn, and Michael A. Baker, "The Fear of AIDS." Harvard Business Review, July-August 1986, p. 28.

(4) Skinner, Wickham. "The Productivity Paradox." Harvard Business Review, July-August, 1986, p. 55.

PROBLEM SOLVING
WITH
GENERIC ALGORITHMS AND COMPUTERS

September 1986 BY Jay Larson, MBA

> "People always get what they ask for;
> the only trouble is that they never know,
> until they get it, what it actually is that
> they have asked for."
>
> Aldous Huxley

Recently, there has been alot of effort spent on putting computers in the classroom. The main justification is that the computer is a problem-solving tool. It is well understood that a computer is best utilized to solve repetitive problems requiring the manipulation of large amounts of data and fast processing with a high degree of accuracy. A series of instructions developed to enable the computer to solve a particular problem is called a program. Programmers are persons responsible for giving the computer these instructions in a specific language. They must derive the solution to a given problem and then insure that these instructions are coded so that the computer can carry them out.

The actual writing of the program, however, is only a part of the larger problem-solving methodology. Programs represent solutions to problems, which are developed by using algorithms. An algorithm is a finite, step-by-step solution to a problem. Algorithms may be narrative outlines of steps needed to solve the problem, like recipes, or they may be composed of pictoral diagrams. Usually programmers will use either psuedocode or flowcharts to detail these solutions. The method used is not nearly as important as the ability to define precisely what the actual problem is and detail exactly in definite steps what needs to be done to solve the problem.

A concise, overall problem-solving strategy was first suggested by George Polya in 1945. (1) All authors on the subject of problem-solving agree that the most critical step is the first one - definition of the problem. It is this step that requires the most imagination, ingenuity, and creativity. The problem must be carefully examined to identify clearly what information must be produced to solve the problem. Then the problem solver must identify the information given in the problem which may be useful in obtaining the solution. Finally, since the computer is only a machine that has no inherent problem-solving capabilities, a procedure to generate the desired results from the given inputs must be formulated as a detailed sequence of simple steps. An outline for this problem definition phase is suggested as follows:

1. Define the problem
    a. Clearly describe the problem

   b. Describe what the output of a succesful solution should be and how it would look

2. Develop the solution
   a. Specify precisely the inputs (the data to be used) and the outputs (the results) in a finite number of steps
   b. Divide the problem into small definite, crystal clear steps which tell exactly what to do
3. Organize, code and document the program

Success in using a computer as a problem solving tool requires a change in the way of thinking or of approaching a problem. Yet the steps used to develop a program roughly parallel the steps in real-life situations. For example, suppose a cook wants to make a dessert. An experienced cook would not often start with a canned recipe; instead he/she would start with the general problem of what to cook. After answering the question of what dessert to make, the cook would decide on the ingredients and follow the steps of the selected recipe. Despite the similarity, a cook´s finished recipe is usually not an algorithm though because it is often vague about the input and output; i. e. a cup of nuts as compared to 5,022 peanuts or a batch of cookies as contrasted to 223 cookies. An algorithm must contain precise descriptions of the data and their relationships. It is vitally important that the computer user know the output requirements before the algorithm can be developed. Entering test data into the algorithm allows us then to test its validity.

Normally, algorithms provide a computer programmer with the logic needed to arrive at the solution to a computer problem. Their development force the programmer to understand the problem better and to set forth the output objectives.(2) They can be used also to indicate areas where more answers are needed. For instance, a business manager wants a program to keep track of items in inventory. The problem from the user´s point of view is keeping track of inventory, providing timely and accurrate reports, and easy to use. However, what the programmer must now do is take these specifications and determine whether or not a computer can solve the problem, and if it can, redefine the problem in such a way that it (1) satisfies the user´s requirements and (2) can be solved by a computer program. Nothing can be assumed. The outputs must be precisely specified; the data needed to produce the desired output must be specified; the formulas or processes needed to solve the problem must be specified. A problem that is not defined precisely, correctly and completely is a problem for which there is no computer solution.

In general, the relationship between algorithms and computers is this: you can almost never solve a problem with a computer without an algorithm, but you can use a algorithm to solve a problem even if you have no computer available. The computer takes everything literally and knows only what it has been told. An algorithm has in fact been defined as a logical sequence of unambiguous operations that when carried out lead to the solution of the specified problem. English is full of ambiguities; alot of words have more than one meaning or shades of meaning that are susceptible to different interpretations. A "heaping teaspoon" may be ok for a recipe but not for a computer program. Also, the computer is very logical and will do things in the exact order in which it is told to do them. Additionally, most problems require careful attention to sequence if they are to be solved, and the algorithm must show the correct sequence. In fact all of the steps even the obvious ones must be included in the algorithm. The computer does not assume anything, even the obvious. For example, a recipe might say "mix the ingredients". A robot (a computer) must be told to "turn on the mixer" prior to being told to mix the ingredients.

Developing an adequate, workable algorithm requires a great deal of attention to detail and a knowledge of the problem. We must ask detailed questions about all the elements of the problem and have taken nothing for granted. Thus, the persons who know the most about the problem are in the best position to develop its solution. If a person can explain the steps used to solve a problem, then that person can use a computer to solve the problem; however, if a person cannot explain the solution to another, then a computer could not be used. Computers don´t understand "intuition" or "gut feelings".

Polya (1945) described what he called the inventor´s paradox. "Sometimes a larger problem is easier to solve than a simpler one. The more ambitious plan may have more chance of success."(3) In other words, it is easier to solve a more difficult problem rather than a simpler one because seeing one problem in context of a lager one often leads to the solution of a simpler one. Once we have an overview of the problem, then the "divide and conquer" problem-solving strategy can come into play. Nearly every problem is composed of several phases made up of smaller steps each consisting of inputs, processing functions and outputs.

For instance, let´s suppose that we´ve been asked to solve the following problem. A teacher would like to use the computer in place of his/her gradebook; that is, he/she would like a program that would post and average all the grades of a particular test, produce as output the class average, the number of students attaining each grade and the total number of failures. To solve this problem, one must begin with the output, deciding what data is necessary to generate the average and the determining the scores needed for each grade. A register or counter must be setup to keep track of the number of students whose scores fall within these ranges, esp. the number of failing scores. One must also know the formula for calculating an average (A=SUM/Total # of items). Also, the problem-solver must determine the number of questions which will be on the tests, in order to calculate the percentage scores to determine the grades. Also he/she must determine whether the instructor grades on a fixed percentage basis or on a curve, which would change the ranges of scores for each grade. In other words, a relatively simple problem can become complicated as the requirements for each of the smaller pieces are developed in terms of input, processing and output. The need for clarity and proper sequencing is apparent as one tries to develop the algorithm or explain to someone who knows nothing about grading or averaging how to create a gradebook. The computer solution cannot assume anything. Actually, the person who knows the most about calculating grades, which may be different than the person who is the most accurate at calculating grades, is in the best position to develop the algorithm because he/she knows the procedures, formulas and correct sequence. The development of the valid algorithm results from knowing what inputs and processing functions are required; consequently, the correct output will always result.

Here is our first indication of the direction that education should take - concentration on the how to, rather than on the correctness of the result. Machines in the classroom can speed up the testing of specific algorithms. It is a very subtle difference but one of great significance. Concentrating, believing that if the problem solving steps are properly determined and arranged that a correct answer will be generated every time the algorithm is used no matter where the data is from. Conversely, a result generated by an inaccurate algorithm could never be trusted. The educational controversy and implication become apparent as we concentrate on the algorithms instead of the outcomes. Should we have each generation of students recreate the discovery of particular algorithms, or should a package of algorithms be presented to each student as their grade-level and understanding advance? Would students "appreciate" algorithms generated by earlier generations? It would seem that the computer offers educators not only the ability to rapidly detect faulty problem-solving strategies but also the opportunity to explore and refine the valid algorithms of the past. Aren´t these the aims of traditional (those without computers) education programs - respect for the past and improvement for the future? Where does problem-solving fit in the scheme of educational goals? Are educators committed to the proposition that a student who has been trained in problem solving can cope the better after graduation than those who have not been so trained? In short, do problem solvers make the best citizens? These are questions that each educator must answer individually before proceeding.

Several problem solving techniques have been used by educators throughout the years. Perhaps one of the oldest is called the scientific method. Development of an hypothesis and the establishment of various alternatives for testing is central to this method. The approach finds validity in a laboratory setting but is almost impossible to computerize because of its "discovery" notion; that is, the outcome is unknown at the time the testing begins. The hypodeductive reasoning method of problem solving also has little application in a computer-type environment because again of its outcome uncertainty. Many problems aren't what they seem to be at first glance. Many problem solvers of the past have used none of these methods but claim to be "guided by intuition" - the answers just came. This is another method that finds little applicability in our computerized society. Only algorithms, their development and their use, not only facilitate the problem-solving process but also allow us to create computer solutions which can be stored, shared and scrutinized. The concepts of psuedocode and flowcharting standardize, solidify and simplify the entire process. Persons who have solved previous problems now have a mechanism that permits them to convey to future generations procedures, processes and practices which may have taken years, even generations, to refine and perfect. The algorithm technique meets the needs of this generation; none of the others could.

Are the problems facing our students significantly different from those encountered by previous generations? If one looks at the small parts, the answer is definitely yes. However, a look at the "big" picture reveals that many problems are just restatements of a previous type. For instance, suppose we were required to put together a jigsaw puzzle. The strategy might be to put all the pieces on a table, look for all the border pieces, separate all pieces of the same color, put the border together and then compare the common colored pieces to the border pieces and fit them together. This same algorithm could be used with all jigsaw puzzles regardless of the number, sizes, shapes, or texture of the pieces. Laying out the algorithm actually helps to classify the problem.

As I have examined the "world" of problems, it seems there are but three major types with contrasting styles within each. The first category, I call the "storybook problems". Here we find the narrative-type problems - tell me how you did that. Our example of the jigsaw puzzle is in this category. The algorithms which solve these problems are either linear (proceed sequencially through one or more series of input, processing, output phases), or use the story tree format (branch through a series of input, processing, output phases based on certain conditions). The solutions to these problems require creativity and imagination. They are probably the most challenging for computer advocates and programmers. The next category, I call the "mathbook problems". As any high school student knows, the math problems come in two types - computational and verbal. The story problems are the least preferred, I think simply, because the algorithm is not given and must be devised. Traditionally, students spend more time solving computational type problems than they spend learning how to develop algorithms from story problems. I´ve noticed that usually the computational problems in a math textbooks out number the story problems by as much as ten to one. Ironically, many educators prohibit their students from using computers/calculators to solve computational problems because they can complete them very fast and without errors. The story problems are usually assigned as extra credit, which means few students try to set up the algorithms (equations) to solve them, or even read the problems. The third type I call the "handbook problems". These look primarily at the inputs/outputs required by the problem. All programmers know that computer languages speak in terms of variables and constants and that numeric and character string variables or constants must be handled differently. Problem solvers must look at the data and its source to determine whether it will be variable or constant. As one develops the algorithm to solve the problem, this condition becomes apparent and the algorithm can be modified to meet these conditions. Nonetheless, the value of being able to classify life´s problems into one of these three general categories provides a researcher with the framework upon which to build new and refine existing algorithms.

FOOTNOTES

1. George Polya, HOW TO SOLVE IT (New Jersey: Princeton University Press, 1945), pp. 5-6.

2. James F. Peters III, PROBLEM SOLVING WITH PASCAL (New York: CBS College Publishing, 1986), p. 13.

3. Polya, op. cit., p. 121.

RECOMMENDED COROLLARY MATERIAL

Brightman, Harvey J. PROBLEM SOLVING: A Logical and Creative Approach. Georgia: Georgia State University, 1980.

Polya, George. MATHEMATICAL DISCOVERY: On Understanding, Learning, and Teaching Problem Solving. New York: John Wiley and Sons, Inc., 1962.

PROBLEM SOLVING
WITH GENERIC
ALGORITHMS AND COMPUTERS

SUMMARY:

Almost every problem is best solved by writing out a step-by-step solution. This is an algorithm. Many problems can be solved by those same steps, if they are written following the data processing steps -input, processing and output. Educators who are dedicated to the purpose of providing students with life-long foundations for problem solving would be able to teach these skills if they only knew how to classify daily problems into one of a limited number of algorithms. Students would then be able to expand their own creative thinking skills by generating variations of these to meet their everyday requirements of managing themselves, their time and other persons. This paper presents the necessary framework/ideas to cause this conceptual problem solving technique become a reality.

METHOD OF PRESENTATION:

Overhead slides with discussion and sample problems.

TARGET AUDIENCE:

Educators of students - 7th grade to adult.

EQUIPMENT NEEDED FOR PRESENTATION:

Overhead projector and blackboard.

OUTLINE

I. INTRODUCTION
   1. Types of algorithmns
      a. narrative
      b. pictoral
   2. Problem definition
      a. First step to success
      b. Not very easy
      c. Stated or assumed

II. ALGORITHMN DEVELOPMENT
   1. What it means to "really" understand the problem
   2. Regular use of algorithmns
   3. What can be assumed?
   4. What does it mean to "think logically"?
   5. Could you tell a robot where to go and what to do?
   6. Why tell someone else what you know how to do well?

III. INPUT, PROCESSING AND OUTPUT STRUCTURE
   1. Output the beginning of the end.
   2. What data would provide the desired results?
   3. What can the computer do to help?
   4. Identification/placement of the symbols
   5. Testing the algorithmn

IV. PROBLEM SOLVING TECHNIQUES
  1. The "scientific" method
  2. Hypodeductive reasoning and problem solving
  3. Algorithmns
  4. Intuition - what is it? Can it be passed to another?
  5. Putting it in words or understandable symbols

V. CLASSIFYING PROBLEMS
  1. Importance of the "big" picture
  2. Linear vs story tree solutions
  3. Verbal vs computational
  4. Variables vs constants

VI. PUTTING IT ALL TOGETHER - SAMPLES TO TRY
  1. Direction problems
  2. Mathematical problems
  3. Classification/sorting problems
  4. The classical algorithmn
  5. The computerized solution
  6. People helping people

OREGON STATE UNIVERSITY
EXTENSION SERVICE

Cal Robertson Williams, Oregon State University Extension Service
Multnomah County Agent
Home Economics

THE FEEDBACK LECTURE METHOD:

TEACHING THE NON-TRADITIONAL ADULT STUDENT

Introduction

The Oregon State University Extension Service Home Economics Program functions on the multiplier effect delivery system. This means we rely on volunteers to help reach adult students who may or may not have formal higher education. The volunteers, who are trained to be Volunteer-Teachers, may or may not have formal higher education either. Their task, as Volunteer-Teachers, is to deliver information to an adult population ranging in age from mid-forties to mid-nineties. This population is characterized by limited time and a need for immediate information. The Feedback Lecture Method of instruction has proven effective in reaching this non-traditional adult student.

The Feedback Lecture Method

Feedback can be defined as authoritative information students receive that will reinforce or modify responses to instruction and guide them more effectively in attaining the goal of the course. The more feedback given, the more effective the teaching. Feedback is especially effective when used to prevent errors and to provide a student with direction and a sense of achievement.

Feedback is part of the teaching rather than the assessment process. It emphasizes progress towards the course objectives and the expectations of the instructor rather than assessment and comparisons among students. Furthermore, it requires observation and evaluation of a student's response or performance, which in turn is based upon earlier instructions. Feedback may be given as oral or written critique, coaching, supervision of performance, review of responses to tests, or in reaction to progress in either individual or group problem-solving. In this project, feedback was given as oral and written responses to groups of individuals.

The Feedback Lecture Method used in this project is a nine-step process which provides a set of guidelines for the Volunteer-Teacher to follow in presenting a particular lesson. Usually lessons are short, 45 minutes to one hour in length, with a definite set of objectives to be achieved.

In step one, the Volunteer-Teacher determines the students' level of knowledge by asking a series of prepared questions relative to the subject. Immediate feedback is given to their responses. Given students' present knowledge of the subject, the Volunteer-Teacher may modify the planned lesson. This brief assessment takes less than 10 minutes of teaching time. In step two, the Volunteer-Teacher provides a sequential order in which the lesson is to be presented, checking to see if students understand the order. Step three, similar to step two, the Volunteer-Teacher provides a list of tasks to be learned, clarifying any uncertainties. In step four, the Volunteer-Teacher provides a general overview of the material to be presented.

Step five is the actual instructions. Keep in mind that each step is summarized by feedback. Step six involves the student in synthesizing and evaluating the newly acquired information in light of their own life experiences. Here the Volunteer-Teacher has an opportunity to not only expand the students' knowledge, but also to expand the lesson base. Step seven is the formal assessement of students' comprehension of the newly disseminated information. Step eight is feedback in printed form for the purpose of reinforcement. It involves a listing of new terms introduced in the lesson and their definitions. Step nine is the students' evaluation of the instructional process and materials.

Conclusion

The strength of the Feedback Lecture Method is its constant nomitoring of students' progress in attaining the objectives of the lesson. This process allows the Volunteer-Teacher to correct non-affective teaching practices during the lesson. Therefore, students are provided with constant feedback of their progress. This is a motivating factor in that students know if the teacher's expectation are being met. This method has been used in many sessions of Extension Volunteer-Teacher trainings. Not only has this method been effective in working with non-traditional adult students in Home Economics setting, but resources suggest its effectivness in working with young children and individuals with short attention spans.

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FEEDBACK LECTURE METHOD: TEACHING THE NON-TRADITIONAL ADULT STUDENT

TRANSPARENCIES MASTERS

USED TO MODEL THE FEEDBACK LECTURE METHOD

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9/86

FEEDBACK LECTURE METHOD: TEACHING THE NON-TRADITIONAL ADULT STUDENT

PRE-TEST

1. EVERY WELL-PLANNED AND COORDINATED WARDROBE SHOULD HAVE THE FOLLOWING SUIT STYLES AND COLORS: ONE SINGLE-BREASTED NAVY BLUE, ONE BLACK DOUBLE-BREASTED AND ONE TAN OR BEIGE SUIT OF EITHER STYLE.

RESPONSE: CHECK ONE _____YES _____NO

2. EVERY WOMAN SHOULD HAVE AT LEAST THREE EVENING DRESSES IN THE BASIC COLORS OF BLACK, NAVY, AND GOLD OR SILVER.

RESPONSE: CHECK ONE _____YES _____NO

3. EVERY PERSON'S WARDROBE SHOULD REFLECT HIS OR HER LIFESTYLE.

RESPONSE: CHECK ONE _____YES _____NO

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FEEDBACK LECTURE METHOD: TEACHING THE NON-TRADITIONAL ADULT STUDENT

PROCEDURAL PAGE

1. Have participants complete pre-test.

2. Read objectives for the lesson.

3. Read introduction.

4. Discuss the four keys for a well-planned wardrobe.

5. Complete the lifestyle chart.

Written by Cal R. Williams
OSU Extension Home Economist

9/86

FEEDBACK LECTURE METHOD: TEACHING THE NON-TRADITIONAL ADULT STUDENT

OBJECTIVES

1. LEARN THE FOUR KEYS TO A WELL-PLANNED WARDROBE.
2. DETERMINE ONE'S LIFESTYLE AND WARDROBE NEEDS.

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FEEDBACK LECTURE METHOD: TEACHING THE NON-TRADITIONAL ADULT STUDENT

OUTLINE

I. Planning a wardrobe for your lifestyle
   A. General Introduction
   B. A Wardrobe for Your Lifestyle Pre-Test

II. Pre-planning
   A. Lifestyle Chart
   B. Wardrobe Inventory
   C. Closet organization

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9/86

FEEDBACK LECTURE METHOD: TEACHING THE NON-TRADITIONAL ADULT STUDENT

INTRODUCTION

A WELL-PLANNED WARDROBE DOESN'T JUST HAPPEN. IT TAKES TIME AND PLANNING AND A WILLINGNESS TO TAKE A CRITICAL LOOK AT YOUR PRESENT WARDROBE AND LIFESTYLE. THIS MEANS COMPLETING A WARDROBE INVENTORY, LIFESTYLE CHART, AND LIFESTYLE ANALYSIS. ALL THESE TOOLS ASSIST IN DEVELOPING A WELL-COORDINATED WARDROBE REFLECTING ONE'S LIFESTYLE.

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DISCUSSION QUESTIONS

1. DEFINE LIFESTYLE

2. WHY IS IT NECESSARY TO CONDUCT A COMPLETE WARDROBE INVENTORY?

3. WHAT IS CONSIDERED A WELL-PLANNED WARDROBE?

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FEEDBACK LECTURE METHOD: TEACHING THE NON-TRADITIONAL ADULT STUDENT

POST-TEST

1. List the four keys to a well-planned wardrobe:

   A.

   B.

   C.

   D.

2. What determines wardrobe needs?

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FEEDBACK LECTURE METHOD: TEACHING THE NON-TRADITIONAL ADULT STUDENT

EVALUATION QUESTIONS

1. Were the objectives accomplished in this lesson? Yes____ No____
   How?

   Why not?

2. Has participation in this lesson been worthwhile? Yes____ No____
   If "yes", how?

   If,"no", what was needed?

written by Cal R. Williams
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9/86

Paper Presented at the 15th Annual Conference of ISII, Atlanta, Oct. 1986

Use of Guided Design in Teaching Educational Assessment Skills

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One important distinction between the professional and non-professional worker lies in the responsibility for making critical decisions. This requirement for decision-making is clear in practically all professional fields, such as medicine, engineering, law, etc. The need to make decisions is particularly a part of the teaching profession. The teacher, who is the "on line" professional, makes literally hundreds of decisions each day in the classroom. A great deal of decision-making takes place in planning how the classroom should be arranged, what specific subject matter will be taught, what learning resources will be used, and how each lesson will be put together and conducted. Once instructional planning is completed, decision-making continues throughout the actual presentation of lessons. New decisions must be made on the "firing line." Should Billy Billings, who is whispering quietly, be called to attention? Should Suzy Schwartz be asked to explain her partially correct answer or should another student be called? Should the class discussion be allowed to follow an interesting tangent, or should talk be redirected to the major topic of the lesson? Perhaps only one other professional makes more decisions - the air traffic controller at a busy airport. Yet teachers generally receive little, if any, direct training in how to make sound decisions.

Beginning teachers typically are taught courses in educational foundations - philosophical, psychological, and social - and then classes in how to organize and present lessons are taken. In the university classroom, student teachers may demonstrate that they have learned the major principles and skills to teach effectively. However, when the student teacher's planned lesson in the school lacks a clear objective, starts with a statement like, "Today I want you to turn to page 154," and generally fails to relate the content of the lesson to the thinking and skill levels of the pupils, the dismayed university supervisor may wonder whether the student teacher has, indeed, learned anything in his or her teacher education courses. What has happened, of course, is that the teacher in training has not transferred classroom knowledge to planning and making decisions about how to teach a unique class of live kids. This lack of transfer should not be too surprising, considering that the principles to be applied were probably not learned in the context of preparing to teach a lesson and a method of making decisions about instruction was not practiced. If beginning teachers are going to be able to apply their coursework to the classroom, the teacher education program should include instruction that actively involves them in making decisions about instruction that will take place in specific classrooms.

In the present study, the teachers being trained were pursuing a credential for teaching handicapped learners. Special education teachers, probably even more than regular teachers, use information about individual pupils when deciding what and how to teach. Thus, their professional training involves more work in student assessment than that of regular classroom teachers. Before lessons are prepared, each pupil's educational needs are to be assessed. Assessment implies that at least several types of decisions should be made. The teacher must decide what questions need to be answered, how to design assessment to obtain those answers, and what the results of the assessment mean for the design of the educational intervention.

The course in which I attempted to teach decision-making was one in which the students primarily were to learn to construct and use informal, teacher-made assessment tools. For about 6 to 7 years I taught this course in a traditional lecture-discussion format. Students left the course being able to construct and administer a variety of assessment techniques, but they were not proficient in tailoring assessment to respond to the unanswered questions about pupils' behaviors and needs. In other words, they did not know how to make decisions about how to design and use assessment tools effectively.

Methodology

In order to help remedy the above difficulty students experienced in applying their knowledge of assessment, I implemented a guided design approach in teaching the major assessment techniques. As most of you already know, in the guided design approach, which was developed by Charles Wales and Robert Stager, learners are guided in making decisions about simulated problem situations. They must not only acquire and use knowledge in designing solutions, but they also are to follow a sequence of carefully designed steps in reaching their decisions. Thus, students learn the content of instruction in a meaningful context and acquire both a way to think about problems and a method for reaching decisions. To refresh your memory of the major steps in guided design, you may recall that basically a problem situation is described. Then the learner is lead from identification of the problem to construction of a solution and an evaluation of it.

I chose to use guided design because my students needed to realize that assessment procedures are not cookbook applications of prepared instruments but that they are a response to a series of decisions one has made about the problems assumed or seen in the handicapped learner. Repeated, guided practice in making these decisions is required. In guided design, the students not only learn about the assessment decisions, but they become decision-makers themselves.

In my particular application, a modified type of guided design book was written. Following the normal format, I wrote out instructions and feedback for each of the decision-making steps in the guided design. However, since most of the basic information about assessment that I wanted to be accessible to the students was not available in convenient sources such as texts, I incorporated it into the content of the guided design book itself. This was usually accomplished by elaborating relatively extensively in the feedback sections on the rationale for decisions that were reached. This form of elaborated feedback is illustrated in the five pages attached to the back of this paper. For instance, in this particular section of the guided design, a type of observation tool that was developed is used in recording a sample of a handicapped learner's behavior. The feedback section then provides a commentary on the features of the observation record that can be seen in the example. In this way, content that might ordinarily be found in other resource material was part of guided design and was related to the results of the decision-making that had taken place.

The book contained four major guided design problems. The first part of the book introduced students to guided design by briefly describing the method and providing a sample guided design problem from Wales and Stager's 1977 publication, Guided Design. In the remainder of the book problems related to developing and using non-standardized assessment in the special education classroom were presented. The same basic setting formed the context for the guided design problems. In the setting two (fictitious) student teachers, Amy and Joel, are assigned to work with a master teacher who guides and assists them as they attempt to plan to assess the educational needs of a new student in class, Art. "Art" is a fifth-grade student whose problem behavior is based upon the school history of an actual special education student. For the first problem, Joel and Amy must decide upon a basic rationale and approach to assessment in special education. Later, they have to solve problems involved in designing assessment tools that will help them answer questions about Art's educational needs. Finally, for each tool used, the student teachers also decide how to make effective use of the information obtained to help Art make progress in school. By the time the students in the class completed the guided design book, they worked through the decision-making process from six to ten times and applied new knowledge about assessment in solving problems that special education teachers face daily.

The mechanics of the group work on the guided designs followed standard procedures. Groups of three to five students worked on the problems in the guided design book for eight 2-hour class sessions. Although a leader was designated to tell the instructor the decisions reached by the group at each step, two or three times during each class the instructor joined the groups to encourage or assist them in their decision-making. Each prepared guided design was followed by an activity in which the student groups developed a similar assessment device by following the major steps in decision-making. For example, after one guided design resulted in the development of a narrative observation instrument, students were directed to follow similar steps in designing the rationale and actual format that would be useful for recording critical incidents in Art's (or any pupil's) school day. Guided design work performed in class was accompanied by a parallel homework assignment that was to be completed independently during the following week. Assignments generally required students to carry out a minor assessment using the tools that had been developed in class.

Results and Discussion

Reaction to the above use of guided design was obtained from 30 students enrolled in four classes from summer 1985 to summer 1986. Their judgment of the effectiveness of guided design and their affect toward it were assessed by four rating scales and an open-ended item (see Tables 1 and 2). The results of this assessment reflected a generally positive response. Two-thirds agreed that guided design was a more effective method of learning than traditional lecture/discussion, but 20% were dissatisfied with it. Even more students (70%) indicated that guided design should be used in other education courses. However, only 40% believed they would use the guided design procedure when making educational decisions in their own classrooms, and only 37% liked solving problems in groups. The most frequent positive comments on the open-ended item revealed that students appreciated the variety in method of learning provided through guided design and the use of an applied context for learning material. Criticisms centered around the length of time needed to work through guided design problems and the need for greater clarity in the instruction.

Table 1

Student Ratings of Guided Design Instruction

1. For me, the use of guided design was more effective than traditional lecture/discussion methods for learning the material in this class.

	Strongly Agree (SA)	Agree (A)	Neutral (N)	Disagree (D)	Strongly Disagree (SD)	No Response (NR)
n =	6	14	4	4	2	0
% =	20	47	13	13	7	0

2. I find that working in groups on problems is a learning style compatible with my desired mode of learning.

	SA	A	N	D	SD	NR
n =	4	7	9	4	5	1
% =	13	23	30	13	17	3

3. I would like to see guided design be used in other professional training courses in education.

	SA	A	N	D	SD	NR
n =	8	13	4	4	0	1
% =	27	43	13	13	0	3

4. I believe I will follow the simulated decision-making process practiced in guided design when making decisions in the field.

	SA	A	N	D	SD	NR
n =	2	10	9	7	2	0
% =	7	33	30	23	7	0

Table 2

Student Responses to Open-ended Evaluation Item

Open-ended response item:

What were specific strengths you perceived in learning with the guided design materials? What did you like about the guided design approach?

approach was different and interesting	n = 14
information was presented in an applied context	n = 11
liked getting ideas from others in group	n = 5
approach encouraged thinking and flow of ideas	n = 5
miscellaneous	n = 7

What were specific criticisms you had about learning with the guided design materials? What did you dislike about the guided design approach?

process took too long	n = 11
instructions were confusing, not sure what we were to do	n = 8
some group members try to dominate	n = 5
miscellaneous	n = 3

Whether guided design was actually effective in teaching students to make appropriate assessment decisions was inferred from the quality of the students' work in carrying out a field assignment in assessment. Over all, grades given to the papers were noticeably higher than those obtained by previous classes on a similar assignment. Grades rose from an average of 86% ("B") to 91%, an "A-." Thus, the outcome of the use of guided design was encouraging.

From my own perspective, I regard the use of guided design reported in this study to be a qualified success. Although my interpretation of student reaction is by no means free of contamination of my investment of time and energy, I believe I can offer some reasonably accurate statements describing student response to learning in a non-conventional manner. First, I noted that the specific composition of the student work groups is an important factor in how successfully students will learn from guided designs. Groups may contain persons who dominate decisions, who tend to get the group off task, who have difficulty understanding other group decisions, or who are generally abrasive. Any of these types of people have a negative effect on learning and the overall quality of the guided design experience. This effect of the group on reactions to guided design was illustrated by the finding that all who indicated a lack of satisfaction with this way of learning also marked a dislike for group work. On the other hand, the positive effects of a supportive, facilitating group are obvious.

Another major influence on student reaction to guided design was the quality and clarity of the written material. Instructions were at times too vague, and this frustrated students when their decisions were not apparently related to the feedback sections in the design materials. Some of the confusion experienced by students could also be a result of their preconceived notions about how decisions should be made. There was a persistent tendency to try to develop specific solutions to problems before problems were clearly identified or goals were established. Once the guided design moved to the stage of developing solutions, students were usually able to proceed with little confusion over the tasks they were to perform in the decision-making steps.

A significant number of students were displeased with the amount of time needed to work through steps in the problems and with time required to work in groups. The steps in the present guided design were also probably more time-consuming than normal because textbook content was included within extended feedback (and to a lesser extent) and instruction sections. Thus, for some students, a "streamlined" guided design probably would have been better received. For example, only the most essential information and critical decision-making steps would be included, and provision for independent work on the problem would be made.

Finally, I was disappointed that only 40% indicated they planned to use the steps in guided design to make decisions in their own classrooms. From informal interviews I discovered that the main reason so few students were anxious to use the decision-making steps was because they believed a procedure as time-consuming as that worked in the classroom could not help them solve "on the spot" problems that arise while teaching. Students need to understand that those are carefully considered decisions that are made in planning instruction and that the deliberate decision-making process in guided design is perhaps better used here than in the split-second decisions a teacher makes on one's feet. Observing and interviewing students after they have been on the job could help answer the question of whether they use the decision-making strategy in their profession.

In all, work on the present project has been a professionally rewarding experience for me. Thus, I anticipate continued development and application of guided design to the regular teacher education program.

EXCERPT FROM GUIDED DESIGN PROJECT

(Example of elaborated feedback)

BEHAVIORAL CATEGORY CODING SYSTEM OBSERVATION

Identifying Information:

Learner: Arthur Adams Sex: M Grade: 4

Observer: Joel Jacobs Date: 5/10/85 Time: from 10:50 to 11:00

Class and activity: Special day class--individualized seat work

Setting: Ten students are seated at individual desks. Twelve desks are arranged in three rows of four desks, but two students are absent. At least four feet of open space exists between all the desks. Art sits in the front of the middle row, facing a chalkboard. Ms. Bell is in the office while the aide supervises individuals' work as they request it. Students have been working for 20 minutes and will get a short recess at 11:05. Each person is to work quietly in a work folder.

Behavioral Categories and Codes:

Area of behavior: Off task behaviors

Categories and codes:

On task

OT	On task behavior, including work at seat, lesson-related talk, or directed movement around the room

Off task

Acts toward or with students; at seat

ST	Talking; 1 = initiating, 2 = responding
SH	Touching with hand or arm, including hitting, pulling, pushing, etc.
SL	Touching with leg, including kicking, shoving, etc.

Acts toward or with teacher aide; at seat

TT	Talking; 1 = initiating, 2 = responding

Acts by himself; at seat

AV	Vocalizing; humming or mumbling quietly with no known target
AM	Manipulating objects, including pencil, book, clothing, etc.
AL	Looking around, gazing

Out of seat

OS Walking or crawling out of seat without being directed by teacher/aide

Behavioral Observation Grid:

time	5	10	15	20	25	30	35	40	45	50	55	60	Notes & Comments
10:50	OT	OT	OT	OT	OT	AL	AL	AM	AM	AM	AM	AL	
10:51	AM	AM	AM	AL	ST1	ST1	ST2	ST1	ST1	OS	OS	AV	Hit Jim once with fist while OS.
10:52	TT2	TT2	TT1	TT1	TT2	TT2	OT	OT	OT	OT	OT	OT	Aide intervenes.
10:53	OT	OT	OT	OT	ST1	ST2	ST1	ST1	AL	ST1	ST1	ST1	Aide says, "Get back to work."
10:54	OT	OT	OT	OT	ST1	OT	OT	AM	AM	AM	AM	AM	
10:55	AM	AL	AL	AV	AV	AV	AL	AL	AV	AV	ST2	ST2	
10:56	TT1	TT2	OT	OT	AM	AM	OT	AM	AM	AM	AL	AL	
10:57	AM	AM	ST1	ST1	ST1	ST1	OT	OT	OT	OT	OT	AM	No response from student.
10:58	AM	AL	AV	AV	AV	AM	AM	AM	TT2	OT	OT	OT	Aide motioned for Art to get busy.
10:59	OT	AM	AM	AV	AM	AM	AM	AM	AM	AM	AM	AM	Rolling pencil down front of folder.

Quantitative Summary:

Category	Percentage of Time
On task	
OT	27.5
Off task	
ST1	12.5
ST2	3.3
SH	0.0
SL	0.0
TT1	2.5
TT2	5.0
AV	8.3

AM 29.2

AL 10.0

OS 1.7

Comments or Summary:

While a great deal of physical interaction with peers was expected, during this observation Art was either on task or engaged in solitary activity 75 percent of the time. The one physical interaction took place when Art was briefly out of seat. The 4-foot spacing of desks may discourage contact.

No on-task segment lasted longer than one minute, and three on task segments occurred after the aide directed Art to return to work. The work is obviously not engaging his attention.

Talking was generally initiated with peers, but his talk to the aide showed twice as much responding as initiating. Responding seemed to be a questioning of authority, which might not be the case when Ms. Bell is present. Both initiating talk with peers and "sassing" the aide could be attention-getting devices, and he may be getting the attention he is seeking. Perhaps ignoring off task talking should be considered (note return to task after ignoring during 10:57).

Feedback H

The student teachers, Amy and Joel, poured over the observation they had made. They then compared it against the five essential qualities they had specified for the observation.

Joel explained that the observation was easy to identify and interpret because of several features in the format. For one, the "Identifying Information" was at the top of the front page. Then, there were a couple of places where notes and comments were called for. Along the side of the grid very specific notes on behaviors or context could be added, and the "Summary or Comments" section invited general impressions and immediate reactions and questions. Also, the "Setting" and "Quantitative Summary" would be used in interpreting the observed behavior.

The evidence for the presence of clear behavioral categories was also pointed out by Joel. He referred to the fact that observable verbs were used in defining the categories, and examples of behavior considered to be in the category were included in most of the descriptions.

The categories were also designed to be both distinct, in order to avoid the possibility of having a behavior fall into more than one category, and comprehensive, in order to be inclusive of all behaviors observed. This quality was achieved for the most part since Art had to be either on task or off task, and when he was off task he had to be either in his seat or out of his seat. In a few instances, however, the category to be marked was not clear. This problem arose primarily when Art was verbalizing while conducting behaviors that fit into other categories. The appropriate category to be recorded when Art was listening to a verbal response of another student or the aide also was not clear.

Amy elaborated upon the convenience of the behavior codes. She stated that the use of two-letter codes allowed each code to be associated with the key words in the category description and make recall of the codes relatively easy. Since there were only two letters to record, and one number in case talking was recorded, about one second was all the time needed to mark the code on paper.

Organization in the actual record of the behavioral codes was achieved satisfactorily in Amy and Joel's judgment. The grid for marking codes provided for a record of not only what behavior happened but also when and for how long it occurred. An interval of five seconds seemed to be about a maximum length to allow for only one category of behavior to occur during an interval. At the same time it was long enough to allow for careful observation, a decision about the category to record, and the marking on the grid. The consistent five-second interval was also easy to monitor on the stop watch. Thus, the format of the marking system provided the structure necessary for consistency in recording observed categories of behavior.

Amy explained that the quantitative summary of observed behaviors was obtained easily by presenting the total number of observations recorded in each category in terms of percentage scores. A tally of the number of times each code was marked was simply divided by the number of intervals in which behavior categories were recorded to obtain the percentage figure. The use of percentages in summarizing the observation also has the advantages of being readily understood and allowing comparisons of the frequency of behaviors recorded during observation periods of different lengths.

Joel and Amy concluded that their observation contained the major qualities they had hoped it would possess. Now they turned their attention to judging the extent to which the observation, as a whole, might be of use in assessing Art's problem behavior. They both recognized that the potential practical usefulness of the observation had already been addressed in the "Comments or Summary" section. While Art did not physically interact with anyone from his seat (though he did rise out of his seat and hit another student), presumably because of the four-foot spacing of the desks, he was disruptive because of his talking, which occurred over 23 percent of the time.

Amy pointed out that the record of behaviors seemed to underscore Art's striving for teacher attention. As noted earlier, he tended to initiate talk with peers but to respond to the adult. When peer talk was initiated, it was followed in two of three cases by adult talk directed to Art. In the one case in which the peer and the aide ignored the talk, he returned to task after 20 seconds.

The fact that Art spent no more than 50 seconds on task at any one time was reiterated by Joel. Joel was also struck by the finding that almost half the time Art was engaged in off task behaviors that were not particularly disruptive. To Joel this suggested that Art also directs his attention to behaviors that do not involve "bugging" others. Perhaps the tasks Art is being asked to complete need to be examined. The content and format of the materials and the type of reinforcers used could all contribute to an apparent boredom with his schoolwork.

A final point made about the usefulness of this observation was that conclusions must be tentative. The behavior sample must be compared to other records of performance obtained at other times and in different settings. Nevertheless, careful examination and comparisons of a series of observations can provide information that may lead to effective intervention strategies by the teacher for the student.

Instruction I--Recommendations

When Joel and Amy presented their self-evaluation of their nonnarrative observation to Ms. Bell, she was delighted that they not only had done a careful job of evaluating but they also had begun to internalize the decision-making process and carried out the evaluation on their own. Now, however, she asked them to consider the type of nonnarrative observation they produced and to recommend how it might be most usefully employed. They were also urged to communicate any particular difficulties others might need to be aware of in the development and use of this type of observation.

Aesthetics, the Arts, and Education:

The Painter as a Model in Aesthetic Education

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In the discipline of art education, the visual arts serve as the focus for potential aesthetic experience. However, a number of artists, especially painters, are often influenced by the sensory elements of aesthetic experience in nature as well as other art forms, including poetry, movement or dance, music, and theatre, as a means to enhance their experience of the visual arts. It is possible, as teachers planning curriculum, to identify the artist as a model for aesthetic experience. We can enrich our students' experience of the visual arts by relating these sensory qualities and other art forms in our teaching of the visual arts.

In this paper I will focus on three painters who exemplify this role and how their contributions to the visual arts can be considered from the broader perspective of aesthetic education. I will place special emphasis on what Melvin Rader and Bertram Jessup refer to as "secondary qualities--sounds, colors, odors, tastes, and textures"[1] because these sensory properties are among the most difficult to communicate. Also, I feel that the examples which follow attest to the significance of these qualities for artists. Finally, I will analyze the form of their works in a context similar to that used by these authors.

In brief, Rader and Jessup discuss three categories, which consist of primary, secondary, and tertiary qualities. Primary qualities refer to the formal properties or structure of an object. As elaborated by the authors, "principles of form are referred to by such terms as thematic repetition and variation, balance, rhythm, progress or evolution, emphasis and subordination, and conformity to type."[2] As already indicated, secondary properties encompass sensory properties. Tertiary qualities may be interpreted as the expressive element of a work of art. This may also sometimes be considered the content or meaning of the work.

Albert William Levi also discusses three similar categories, attributed to Charles Sanders Peirce, for examining literary works, specifically poetry. However, these characteristics of "Firstness, Secondness, Thirdness"[3] have broader applications to works of art in general. Firstness refers to the "immediate qualitative aspects of all our perceptual experience: the color of magenta, the odor of attar, the sound of a railway whistle, the taste of quinine."[4] Whereas firstness focuses on sensory properties like those described earlier in regard to Rader and Jessup, secondness deals with tension and opposition; "It is the sense of the action and reaction of bodies, of movement in all its infinite variety, of dynamism in the world and the sense of strain and muscular effort in our own bodies."[5] Thirdness coincides with tertiary qualities, as these qualities "point to something beyond themselves, stand for something beyond their immediate presence, have the capacity to symbolize ideas or meanings which transcend their own local particularity."[6] As Levi concludes, "The ultimate characteristic of any painting or sculpture, any work of literature or drama, is that its threefold function is the presentation of qualities, the delineation of movements, and the expression of meanings."[7]

Kandinsky

Perhaps one of the most obvious instances of a painter with Renaissance-like interest in all the arts is Wassily Kandinsky. Kandinsky was not only a painter, but also a poet, and strongly interested in the correlations between painting and music. His writings, On the Spiritual in Art, can also classify him as an aesthetician.

In a poem, like Bassoon, the metaphors of music and color, as expressed through literature, are obvious. What is also especially clear is the attention to movement in the lines, "a dry, naked tree stretched its quaking and quivering long branches into the deep sky,"[8] which contrasts with "the little leaves turned stiff: as if cast out of iron."[9] It is not difficult to imagine even young children appreciating this poem. For instance, imitating the body postures associated with quivering or being motionless is one means of conveying what is being communicated.

The musical reference to the bassoon alludes to the sounds this instrument can emit and yet this sense of sound is related by color. A yellow can be shrill as it becomes very intense or bright, just as notes reach higher and higher. Now the tree has a "luxurious crown" of which the "bassoon attempted to describe the color" but it "couldn't reach this note."[10] This last line conjures up images of, perhaps, another instrument that could. Thinking in terms of musical instruments and colors, the bassoon is a low, sometimes melancholy, sounding woodwind instrument. It seems Kandinsky's reference is to a season of lush flowering which may befit a trumpet or brass instrument to announce it.

In terms of art historical iconography, the symbolism may be deeper and relate to the resurrection of Christ because of the choice of a crown in describing new growth. This would also reinforce the appropriateness of the feeling of ebullience for which trumpets are often used in musical compositions of this same theme. Furthermore, the opening lines of this poem create the opposite feeling, more like the bassoon and aptly reminiscent of Kandinsky's painting, Winter I. Thus, one medium or art form is suggested by another.

In the poem, White Foam, and more subtlely in Seeing, Kandinsky makes use of a theme which recurs in his visual as well as his poetic imagery, which is a horse and its rider. In terms of form, these poems are typical of Kandinsky's use of repetition and variation. Elizabeth Napier points this out more generally in her comment, "Kandinsky's interest in types of patterning and variation is pervasive in Klänge. The simplest form of patterning, basic repetition, recurs as a fundamental syntactical and metrical device in his poems."[11] Specifically, in White Foam this form is evidenced by the line: "Anyway it's already foaming and is growing whiter and whiter from the white hot foam."[12] Via this use of repetition and rhythm, the horse described as "ravenblack"[13] seems simultaneously its opposite, white, "turning all white from the white hot foam!"[14]

The speeding and erect Blue Rider spurs across green, flat fields and recalls these same lines of Kandinsky's poem. The red eye of the thoroughbred makes it appear maddened or frenzied and wild. As a result of Kandinsky's rhythmic brushwork, so carefully metered, one can hear the hoofbeats ring out and feel the pounding heart and panting breath of the horse with its equally measured muscular contractions and gait.

Seeing, in its first few lines, conveys a whimsical attitude, almost nursery rhyme-like in the animated qualities of the colors; for instance, "Blue, Blue got up, got up and fell."[15] It ends literally with a "crash,"[16] which suggests change and a subsequent shift of feeling. Napier comments that "in constructing landscapes of 'alternatives,' Kandinsky hints at a reality which is unfixed, in which perception becomes a paramount importance."[17] This comment regarding Kandinsky's approach to his poetry ties in with Levi's term, taken from Peirce, of the use of opposition in poetry.

Just as his book of poems in entitled Klänge, or Sounds, so it seems befitting Kandinsky's poetry includes a poem entitled Seeing because of his impact on seeing with his use of abstraction in painting. Seeing, similar to Bassoon and White Foam, characterizes sounds and motion with color imagery; for example, "Sharp, Thin (blue) whistled and shoved,"[18] and each time "white leap"[19] is repeated the reader is exposed to sound and movement. The latter is particularly expressed by the physical arrangement of the words on the page where leap is inserted between words which allows the reader's eye to skip ahead to where the word is identical. A poem like this invites choreography and yet the meaning, that of change, can be probed to reveal more than a simple dance. Thus, the integration of sensory qualities, opposition, and expressiveness unifies these works of poetry.

In The History of Color in Painting, Faber Birren has selected a number of quotes from Kandinsky which evidence analogies between colors and music. One such quote attributed to Kandinsky is, "The pure, joyous, consecutive sounds of sleigh bells are called in Russia 'raspberry jingling.' The color of raspberry juice is close to . . . light, cool red."[20] This remark attests to Kandinsky's virtuosity for aesthetic experience. His mention of this unique and appropriate image further indicates his appreciation for the immediately sensuous to impart images. Raspberries, especially when picked fresh off the bush in one's own backyard, tingle in one's mouth. The tart sweetness has a lightness like a troika jauntily making its way across the packed crisp snow. The small beads of juice are like little bells. The image seems especially clear if one substitutes strawberries for raspberries. A ripe strawberry hangs on a vine pulling it down with its weight, more like a heavy cowbell. By contrast, raspberries evoke lightness.

Several of Birren's collected quotes come from Kandinsky's book, On the Spiritual in Art, where Kandinsky especially explores the qualities of color in terms of taste, smell, and sound. Although it was not necessarily his conscious intention, Kandinsky's descriptions of the intrinsic qualities of certain colors bring to mind some of his best known paintings. His insights also provide apt explanations for abstract works of art. For example, Kandinsky remarks, "In the case of the eye, some colours look sharp or piercing, while others appear smooth like velvet, so that one feels inclined to stroke them (dark ultramarine, chrome oxide green and rose madder); even the distinction between the warmth and coldness of a shade is based in such feelings."[21] This statement could be illustrated by Black Lines with its use of such colors as ultramarine where the feeling is exaggerated by fuzzy, soft contours of shapes and the tension of arcs of black lines and jagged crosshatching. The sensation of advancing and receding color, so prominent in early abstract compositions, could be expressed to a young audience by citing Kandinsky's observation of yellow as "a spreading movement outwards from the center," whereas blue is "like a snail hiding in its shell."[22] Black Lines exemplifies this sensation through the use of color and shape in the composition. The blue is nestled among brighter colors causing it to withdraw, whereas the yellows are placed on the periphery and bleed or spread to the edge.

Finally, Kandinsky's later paintings of geometric shapes in a Bauhaus style make this correlation among the arts especially obvious. Regarding Graceful Ascent, Herbert Read writes that "in this painting the formal elements have a structure analogous to a score of music, and can be 'read' in time as well as taken in instantaneously as a visual unity. Grohmann says of this painting: 'It has a quite firm structure, but the delicacy of the railings and the ceramic colors (rose, bright green, light brown) make one think of a chime or bells or Spring in Luxembourg Gardens.'"[23] Thus, others perceive this analogy between music and visual elements in Kandinsky's work and even describe the sense of color as eloquently as he himself might have.

Van Gogh

Vincent Van Gogh epitomizes a painter who is as articulate with words as he is with paint. Volumes of his letters attest not only to his writing ability but to his interest in literature, as he often recommends books--including the works of Zola, Balzac, and Guy de Maupassant--to his brother Theo or fellow artists. Interspersed with his letters are poems which he has read and sometimes criticized, indicating his versatility among art forms.

In his writings to Emile Bernard, Van Gogh reviews his friend's poetry in terms of "form" and "ideas and sentiment"[24] which closely parallel the principles of form and content or meaning already discussed at the outset of this paper. Van Gogh cites passages he finds pleasing or unclear to substantiate his opinion. His attitude regarding the importance of this other art form is reflected in his advice to Bernard: "In short it is not as good as your painting yet; never mind, it will come; you must certainly continue your sonnets. There are so many people, especially among our comrades, who imagine that words are nothing--on the contrary; isn't it true that saying a thing well is as interesting and as difficult as painting it? There is the art of lines and colors, but the art of words is there nonetheless, and will remain."[25]

An anecdote recounted by one of Van Gogh's biographers, Marc Tralbaut, also reveals the close relation between music and painting for Van Gogh, not unlike Kandinsky. According to the story, "During his lessons Vincent kept comparing the notes of the piano 'with Prussian blue and dark green . . . all the way to cadmium yellow.'"[26]

One of the earliest references to poetry in Van Gogh's letters is The Evening Hour by Jan Van Beers. Curiously, this work seems to foreshadow Van Gogh's repeated pictorial handling of similar subject matter. Quite clearly, it is an early indication of his interest in the peasants and the countryside. Even the reference to "the Painter"[27] is significant; Van Gogh's choice of his profession did not come easily, as he had started out in his uncle's business of selling works and prints of art before becoming a painter. Simultaneously, Van Beers' specific attention to color--an element of painting which enthralled Van Gogh--such as the line, "little puffs of peat-smoke, tinged with blue"[28] would appeal to him. The "harvest of buckwheat"[29] would complement the blue smoke, in addition to the "gold of the evening sun."[30] Such patterns and textures of landscapes and complementary color schemes, most obviously represented by "purple and yellow had already faded to gray,"[31] pervade Van Gogh's works as illustrated by several paintings in particular. (It is also worth noting that complementaries, when mixed on a palette, create gray. Van Gogh's fascination with this phenomenon is only equalled by his predecessor Delacroix.)

The Harvest, one of Van Gogh's best known works, evidences the orange and gold haystack dominating the wheat fields, in contrast to lavender-blue wagons and outline of distant hills with scattered cottages. A greater sense of evening while conveying a comparable theme is Wheatfield with Crows, which recalls the harmonies of Prussian blue and cadmium yellow referred to above. Two asymmetrically balanced discs of cobalt blue--one small and low, the other larger and slightly higher--gives the illusion of moonlight as the Prussian blue sky recedes and the emphasis is on the impasto and staccato brushwork of bright yellow wheat.

The most literal representation of the theme expressed in Van Beers' poem is an early work by Van Gogh that could easily be mistaken for another artist, so strongly associated with Van Gogh's style in his use of complementary color and visible texture. Cottage in Evening Twilight is consistent with Van Gogh's realistic handling, and in tone reminiscent of his Potato-Eaters, but lacks the more characteristic brushwork. The grayed green shadows surrounding the thatched cottage and the barely visible female figure--as suggested by the long dress and bonnet--standing in the doorway conveys the hour. The blue-green grayed expanse of still sky disturbed by a faint rose streak or "crimson blush"[32] further portrays the dusky quality of twilight. This painting has a definite feeling of retirement or rest unlike the luminous and agitated canvas of Wheatfield with Crows where the birds skim across the stirring stalks leaning with the wind, as defined by rhythmic diagonal strokes of cadmium yellow and ochre.

Perhaps the most memorable image which this poem also brings to mind is that of Van Gogh, the painter, making his way along a road laden with his accoutrements. The Painter on the Road to Tarascon is unmistakably Van Gogh, wearing the blue smock and hat described in letters or represented in portraits of Van Gogh by fellow artists. He carries his paint boxes, canvases, drawing frame, and walking stick. The frame is especially significant as a clue to identifying the person, since Van Gogh devoted several lines in a letter to explain its use and importance to Dürer. The forward movement is accented by the bent knees and raised leg as he pushes off with the opposite foot.

Reinforcing this thesis of complementaries or tension of oppositions, Birren remarks on this use of color by also quoting from Van Gogh's letters. Regarding Night Café, Birren notes Van Gogh described it in these terms: "'I have tried to express in this picture the terrible passions of humanity by means of red and green. The room is blood red and dark yellow with a green billiard table in the middle; there are four lemon-yellow lamps with a glow of orange and green. Everywhere there is a clash and contrast of the most alien reds and greens, in the figures of the little sleeping tramps, in the empty, dreary room, in violet and blue.'"[33]

From this account it is clear Van Gogh is concerned with all three qualities presented in this paper. The immediate or vivid qualities of blood are used to relate the shade of red, whereas the taste, color, and scent of lemon reveals the lamps. The tension and vividness contributes to the expressiveness of the setting. The exaggerated perspective of the green billiard table competes with the expanses of red walls, whereas the yellow glow adds a repulsive tang, enhanced by the stooped bodies and half-empty yellow wine glasses.

Van Gogh's ability to recognize and articulate these traits is remarkable. No less impressive is his verbal rendering of what he has rendered with his brushes. One need only read a few lines of a letter to Theo to create a visual image in one's mind of the painting to which he is referring.

Again, the image appeals to several of the senses, as in the taste of citron or "fresh butter"[34] to depict the wood of the bed and chairs. Complements, or oppositions, abound: pale violet offsets fresh butter; red tiles reflect lemon-green linens; the green window contrasts with the scarlet coverlet, yet both are the same in the rectangular shape; the toilet table, in turn, holds a blue basin; the door is lilac to balance the citron overtones of otherwise greenish linens. Sensations of movement are conveyed by its opposite, repose. This carefully balanced composition is meant to express quiescence and yet, as Enid Verity comments regarding this painting, "the visual interactions of the vibrating colors are already felt."[35]

Van Gogh has transformed the subject matter of the bedroom to convey broader qualities of sleep, perhaps subconsciously. The result tends to be surreal, like the convincing incongruencies of dreams. The setting is believable in its drawing but the vivid coloration conveys an artistic interpretation. His verbal description is of the painting and not the actual bedroom. Ironically, his skill engages the imagination he desires to put at ease. Perhaps, the fascination with this often-reproduced work is that in many ways it is a self-portrait using still life objects. It seems difficult to dissociate the significance of whose bedroom this was from how it was painted. The works of art hanging on the wall especially suggest its absent sitter, as do the blue smocks hanging on pegs with a yellow straw hat at the head of the bed. The chairs even recall Van Gogh's other portraits of individuals, including himself. Upon his father's death or Gauguin's leaving, Van Gogh painted a chair with a few hints of its original owner such as a pipe and specific books.

Particularly in their discussion of tertiary or expressive qualities, Rader and Jessup refer to these as "'felt qualities.'"[36] It is this type of gestalt which Van Gogh seems to be trying to communicate in his correspondence regarding one of his orchard paintings, Peach Trees in Blossom or Souvenir de Mauve. He relates, "Working directly on the spot all the time, I try to grasp what is essential in the drawing--later I fill in the spaces which are bounded by contours--either expressed or not, but in any case felt--with tones which are also simplified, by which I mean that all that is going to be soil will share the same violet-like tone, that the whole sky will have a blue tint, that the green vegetation will be either green-blue or green-yellow, purposely exaggerating the yellows and blues in this case."[37]

Van Gogh's account also coincides with Rader and Jessup's criteria of "more perfect unity in variety"[38] and "intentional origin,"[39] meaning an artist's unique style. In terms of composing, Van Gogh realizes the value of simplifying nature instead of copying nature as viewed directly in front of him. In combination with the exaggeration of colors, he is able to capture the essence of the scene, or its overall "felt" qualities, of springtime expressed by blossoming peach trees. The profusion of the entire orchard results from focusing upon one slender tree with dashes of pink and yellow paint, bursting the perimeters of the frame and confines of the fenced yard. The impasto brushwork which typifies Van Gogh's style allows the petals to form sprays of fresh shoots which look as if they could be plucked from the delicate boughs which consist of mere lines, yet rendered in a calligraphic fashion as distinctive as his signature.

Picasso

Picasso's diversity within the visual arts, alone, makes him formidable. His creations in the visual arts range from painting to printmaking and collage, to bronze sculpture and ceramics. However, perhaps less well-known is Picasso's poetry and participation in numerous theatre productions. According to Clive Bell, these art forms of painting and poetry, as well as plays, were so interdependent for Picasso that "Picasso, the most visual of poets, is a literary painter."[40]

Judging by this statement, it therefore seems quite befitting to use Picasso's The Old Guitarist to illustrate another poet's work, The Man with the Blue Guitar. The apt juxtaposition of Walker Stevens' poem and this classic painting from Picasso's blue period, in The Many Ways of Seeing, suggests the influence one art form often has upon another. Picasso's interest in music and dance can be inferred from a number of his pictorial works. Prominent examples include Three Musicians, The Dance, Ma Jolie, and several still lifes, such as Mandolin and Guitar and Bottle, Glass, Violin.

Picasso's integration of these other art forms can be related to his activities with the theatre. Whereas Kandinsky's involvement in theatre was a culmination of his belief in the interrelatedness of the arts, Picasso's recognition of this phenomenon came about through his involvement and seems to parallel his artistic development. As Jacques Lassaigne points out, "Kandinsky was able to realize his ideal of a synthesis of the arts in the production of Moussorgsky's 'Pictures from an Exhibition' . . . ."[41] Picasso, on the other hand, was gradually introduced to this synthesis.

Picasso's initiation into theatre began with Parade, yet his predisposition toward the theatrical is evidenced by his self-portrait in harlequin costume and his love for the spectacle of the circus and its actors. Picasso's potential was recognized by Serge de Diaghilev and Jean Cocteau. The stamp of "intentional origin" and "character and distinction,"[42] referred to by Rader and Jessup, seems to be the earmark of Diaghilev's ballets. As Douglas Cooper points out regarding the choice of a circus theme for Parade, it was "an innovation to take a scene of 'popular life' as the subject for a ballet."[43]

In retrospect, it is not difficult to realize the appropriateness of also choosing Picasso to design the sets and costumes, considering his past interest in the circus and his innovative approach to Cubism. Picasso was capable of deliberately applying his own original and distinctive style. Cooper describes how the settings and costumes looked, as follows:

> Centrally placed at the back of the stage was a performer's booth, its entrance closed by a curtain which parted to reveal a white back-cloth; on either side of this booth a low balustrade opened out. To the left, right and behind were tall buildings (with rows of windows) between which some trees appeared on the right side. The whole scene was composed in flat synthetic cubist planes, without perspective, the booth being flattened so that its proscenium arch, dominated by a gilt lyre, rose to a peak at the left, where the side had been pulled round to show part of a decorative panel with a dancer waving a tambourine. In this simple urban setting, cubistically conceived as a sum of factual elements, each of the performers appeared in turn . . . . The Chinese Conjuror came first, wearing a many-pointed hat in red, yellow and black, a red tunic striped with yellow rays and ornamented in front with white conch-like curlicues, and black trousers with wavy yellow bands . . . lastly two Acrobats in white tights with a meandering design in blue.[44]

While Picasso was successful in the use of obvious oppositions, such as black and white or black and yellow, Jean Cocteau noted the lack of unity in the incorporation of movement by remarking, "'The Managers . . . were a weakness because they moved inside carcases which, when they were motionless, already expressed movement in their form and colouring.'"[45] Thus, Picasso needed to integrate his handling of the costumes with the action of the performers. Picasso developed this sense gradually. The dynamism of the dancers introduced an element that Picasso had not needed to deal with in his Cubistic work on a stationary, flat surface or canvas. One can imagine how cumbersome the constructions with several awkward extensions were, particularly in comparison to the more close fitting costumes with designs such as those improvised on the tights of one of the acrobats.

This element of choreography provided Picasso with an insight into ballet and theatre, enhanced by the sketches he drew at rehearsals. His active involvement in rehearsals resulted in an effect on his handling of the moving human form and compositions of groups of figures. Perhaps one of the most eloquent examples of this influence in Picasso's painting is the piece, The Dance, where three figures are composed to create a sense of movement. The "strain and muscular effort"[46] is readily evident.

Instead of static poses, the three dancers have their legs partially lifted in the air as if about to take a step or turn in space. Tension is created by the contorted dancer on the left stretching back from the waist, almost off balance, being pulled by the extended arm of the male dancer opposite her. The dancer in the center, in a posture resembling a stork, reaches upward to join hands with the other two. Her placement slightly in the foreground makes her the focal point of the composition. As the viewer's eye moves upward to where her hands are joined to the others, it then follows the exaggerated contours of the other figures which vibrate in their sinuous curves and sharp staccato angles. The minimal suggestion of doors opening to a balcony resembles a theatrical backdrop by its lack of definition and flat quality. This further directs the viewer's eye to focus on the energetic and animated trio, while creating a setting for them.

In addition to his exposure to dance, Picasso became friends with renowned musicians like Erik Satie and Igor Stravinsky as a result of his involvement with theatrical productions. His portraits tend to document these relationships. In a production like Pulcinella, Picasso capitalized on folk art and puppetry. The caliber of this piece is critiqued by Stravinsky himself who notes, "'Pulcinella was one of those spectacles--and they are rare--in which everything holds together and all the elements, subject, music, choreography and decorative scheme form a coherent and homogeneous whole . . . . As for Picasso, he performed a miracle and it is difficult for me to say what enchanted me the most, his colour, his plastic sense or the astonishing sense of the theatre displayed by this extraordinary man.'"[47]

It is intriguing that Stravinsky employs much of the criteria for exemplar or outstanding works of art already discussed. In essence he is referring to the unity of the performance, which Rader and Jessup describe as "the all-inclusive principle of form to which all the other principles contribute."[48]

Therefore, while these works represent only a few instances of Picasso's involvement in the theatre, they are among those in which Picasso participated in all aspects of the production. He was daring, innovative, and recognized the need to integrate not only the elements of his own art form, but those of the other art forms of music, dance, and drama. As presented here, Picasso is not alone in his understanding of this interrelationship. Kandinsky and Van Gogh repeatedly evidence their reliance on other art forms in developing their own art form as painters.

While some may argue that these artists are exceptions, one need only think of Rembrandt's extensive collection of costumes, Degas' ballerinas, Mondrian's Broadway Boogie-Woogie, Matisse's Jazz series and The Dance studies, O'Keeffe's Blue and Green Music, or Whistler's Nocturne in Gray and Silver, to acknowledge the extent of this phenomenon. These artists, among many others, attest to the influence and importance other art forms hold for painters. That the painter serves as a role model for aesthetic education merits further exploration.

References

[1] Melvin Rader and Bertram Jessup, *Art & Human Values*, p. 26.

[2] *Ibid.*, p. 31.

[3] Albert William Levi, *Literature, Philosophy, & the Imagination*, p. 141.

[4] *Ibid.*

[5] *Ibid.*

[6] *Ibid.*, p. 142.

[7] *Ibid.*, p. 143.

[8] Wassily Kandinsky, *Sounds*, p. 25.

[9] *Ibid.*, p. 26.

[10] *Ibid.*

[11] Elizabeth Napier (translation and introduction), *Sounds*, p. 3.

[12] Kandinsky, p. 86.

[13] *Ibid.*

[14] *Ibid.*, p. 87.

[15] *Ibid.*, p. 21.

[16] *Ibid.*, p. 22.

[17] Napier, p. 7.

[18] Kandinsky, p. 21.

[19] *Ibid.*, p. 22.

[20] Faber Birren, *History of Color in Painting*, p. 94.

[21] Kandinsky, *On the Spiritual in Art*, p. 42.

[22] *Ibid.*, pp. 62-63.

[23] Herbert Read, *Kandinsky*, p. 20.

[24] Vincent Van Gogh, *The Complete Letters of Vincent Van Gogh*, Vol. III, p. 480.

[25] *Ibid.*, p. 481.

[26] Marc Edo Tralbaut, *Vincent Van Gogh*, p. 135.

[27] Gogh, Vol. I, p. 9.

[28] *Ibid.*

[29] *Ibid.*, p. 10.

[30] *Ibid.*

[31] *Ibid.*

[32] *Ibid.*, p. 9.

[33] Birren, pp. 88-89.

[34] Gogh, Vol. III, p. 86.

[35] Enid Verity, *Colour Observed*, p. 143.

[36] Rader and Jessup, p. 42.

[37] Gogh, Vol. III, p. 478.

[38] Rader and Jessup, p. 42.

[39] *Ibid.*, p. 43.

[40] Clive Bell, "Picasso's Poetry," *Picasso in Perspective*, p. 86.

[41] Jacques Lassaigne, *Kandinsky*, p. 99.

[42] Rader and Jessup, p. 22.

[43] Douglas Cooper, *Picasso Theatre*, p. 19.

[44] *Ibid.*, p. 25.

[45] Jean Cocteau, quoted in Cooper, p. 25.

[46] Levi, p. 141.

[47] Igor Stravinsky, quoted in Cooper, p. 48.

[48] Rader and Jessup, p. 38.

Bibliography

Bell, Clive, "Picasso's Poetry," in Picasso in Perspective, Ed. by Gert Schiff, Englewood Cliffs, N.J: Prentice-Hall, Inc., 1976.

Birren, Faber, History of Color in Painting, New York: Rheinhold Publishing Co., 1965.

Cooper, Douglas, Picasso Theatre, New York: Harry N. Abrams, Inc. 1968.

Dallas Museum of Fine Arts, Vincent Van Gogh: Drawings/Watercolors, Zaandam: C. Huig Ltd., Oct. 6 to Nov. 4, 1967.

Gogh, Vincent Van, The Complete Letters of Vincent Van Gogh, Vol. I, II, III; Boston: New York Graphic Society, 1978.

Herbert, Robert L., Ed., Modern Artists on Art, Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1964.

Kandinsky, Wassily, On the Spiritual in Art, Ed. by Hilla Rebay, New York: Solomon R. Guggenheim Foundation, 1946.

Kandinsky, Wassily, Sounds, transl. by Elizabeth R. Napier, New Haven: Yale University Press, 1981.

Knoedler, M., & Co., Kandinsky: Parisian Period, 1934-1944, New York, Oct. 21 to Nov. 22, 1969.

Lassaigne, Jacques, Kandinsky, Cleveland, Ohio: The World Publishing Co., 1964.

Levi, Albert William, Literature, Philosophy, & the Imagination, Bloomington, Ind.: Indiana University Press, 1962.

Los Angeles County Museum of Art, Vincent Van Gogh: Paintings & Drawings, Oct. 14 to Dec. 1, 1969.

Museum of Modern Art, New York, Picasso Retrospective, Ed. by William Rubin, Boston: New York Graphic Society, 1980.

Rader, Melvin, and Jessup, Bertram, Art and Human Values, Englewood Cliffs: Prentice-Hall, Inc., 1976.

Read, Herbert, Kandinsky, London: Faber and Faber, Ltd., 1954.

Stedelijk Museum, Amsterdam, Vincent Van Gogh, cat. no. 134, Summer, 1955.

Tralbaut, Marc Edo, Vincent Van Gogh, New York: Viking Press, Inc., 1969.

Verity, Enid, Colour Observed, London: Macmillan Press, Ltd., 1980.

Washington, D.C., Gallery of Modern Art, Vincent Van Gogh: Paintings, Watercolors, and Drawings, Feb. 2 to March 19, 1964.

Highlighting The Scientific Method Through Mathematics Problems

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While the use of the "scientific method" is influenced by the setting in which it is being employed, some key notions are always involved when one is using the scientific method of inquiry. These notions include observing, questioning, inferring, keeping records of data, hypothesizing and generalizing. All these activities are a part of a more general process known as induction. Induction may include many observations and experiments. In the context of natural sciences such as biology or chemistry or human sciences such as psychology or sociology, the scientific method is pursued in a very rich environment. This means that a multiplicity of variables impinge on the phenomena being studied. For those being initiated into the scientific enterprise, that is students, this may create difficulty and disguise the process because of the effort to control all but pertinent variability. The thesis of this paper is that virtue exists in modeling the scientific method in a less variable-rich environment, namely mathematics.

Before looking at some examples of activities that constitute such modeling, we will look in more detail at

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what a model is. A model is a representation or partial account of something. The model must be separated from what is being modeled. There is similarity in structure between the model and what is being modeled, but there are also differences, usually obvious, between the two. Some characteristics that models may possess include

i. The model often simplifies the situation

ii. A model is often ideal

iii. A model may be discarded when its usefulness is ended (Richards, 1979).

The concept of model is used here in the broad sense of representing the process of scientific enquiry. The processes used in certain mathematical problems are analogous to the more generic processes of the scientific method. Many of the steps employed in obtaining solutions pattern the behavior used in scientific investigation. These include simplification, keeping records and collecting data, looking for patterns, hypothesizing and testing, and finally generalizing. Negatively, one must realize that the mathematical setting used lacks the complexity of settings for natural or human sciences. The variables present in a mathematical context can be readily manipulated and their numbers easily controlled while in other contexts this manipulation and control may be quite difficult or impossible.

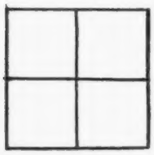
As a closing support for the use of mathematics problems as a model for scientific inquiry, let us juxtapose the characteristics of a model listed earlier with mathematics problems. First, mathematics *simplifies* the situation because it shields the inquiry from the intrusion of extraneous variables or experimental "noise". Hence it is a "cleaner" environment for investigation, and one has reason to expect that the process will be more clearly etched. Mathematics acts as an *ideal* model in that it presents characteristics that should be copied or repeated whenever possible. The idea that a model is *transient* applies to mathematics problems in that the problems dealt with may be simple and of no long range interest except for the process involved in the solution.

Example Problems

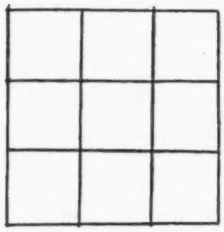
In order to make more concrete what has been discussed in the preceding paragraphs, two problems will be shown with emphasis on the analogy of the processes used for solution and the scientific method.

Problem 1: How many squares are on a checkerboard? (i. e. an 8 x 8 square grid)

Some will answer immediately that there are 64. There are at least that many counting only the 1 x 1 squares. But observe there are 2 x 2's, 3 x 3's, 4 x 4's, etc. And those are partially overlapping in many ways. Hence, we conclude that this problem is not *too* easy. In fact, the 8 x 8 dimension may be causing much of the difficulty. If the grid was a 2 x 2 or 3 x 3, it would be much easier to count the squares.



5 squares



14 squares

The solution evolves by working with the simpler related grids, keeping records of the data, looking for a pattern and ultimately observing that the number squares on the original grid is

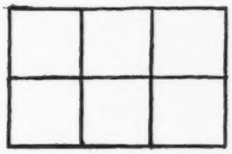
$$8^2+7^2+6^2+5^2+4^2+3^2+2^2+1^2$$

This solution has been found by an instinctive process that is analogous to processes of natural science and human science. The solution can be readily generalized to an N x N grid by noting that the number of squares is

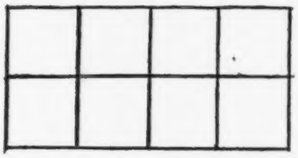
$$N^2+(N-1)^2+...+3^2+2^2+1^2$$

Problem 2: How many squares are on a rectangular grid?

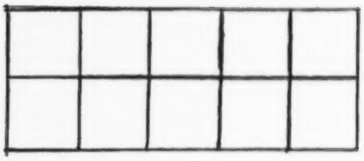
While problem 1 had only one variable, the dimension of the square grid, this problem has two variables, namely the length and width of the rectangular grid. Hence to attack this problem in a manner similar to that used on problem 1 will require controlling variables. That is, hold one dimension constant and let other vary in a systematic way. It may be necessary to repeat the process several times to pick up a pattern. For example, hold the width constant at two and let the length range over three, four, and five, and count squares.



6 + 2

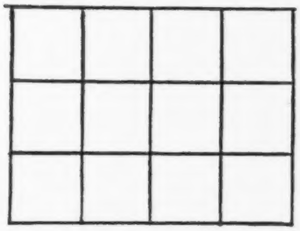


8 + 3

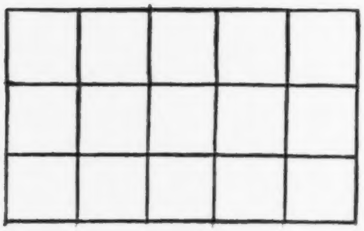


10 + 4

Now increase the width by one to three and let the length be four and five and count squares



12 + 6 + 2



15 + 8 + 3

Continuing observation and analysis of such examples leads to the observation of the pattern that the number of squares on a 4 x 6 grid is

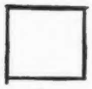
$$24 + 15 + 8 + 3 = 4\times6 + 3\times5 + 2\times4 + 1\times3 = 50$$

and in general the squares on an M x N grid is given by the following calculation.

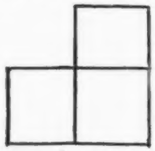
$M\times N+(M-1)(N-1)+(M-2)(N-2)+(M-3)(N-3)+\ldots$ until it is not possible to continue. This problem again highlights the strategies of simplifying, data colection, looking for patterns, hypothesizing and generalizing. In addition, it also includes the idea of controlling variables and letting others vary in a systematic fashion.

Additional Problems

1. I am building steps with blocks in the following way



1 step



2 steps

How many blocks will it take to build 10 steps? How about 20 steps? How about N steps?

2. What is the maximum number of chords that can be drawn on a circle by placing 10 points on the circle? What if you put 25 points on the circle? How about N points?

3. What is the minimum number of weighings (barring luck) using an equal arm balance to isolate one counterfeit coin in ten? The counterfeit is lighter than the others. What about one counterfeit in 30 coins? How about 198 coins? How about N coins?

Conclusion

In summary, the problems outlined and those suggested in the preceding paragraphs have merit in themselves for use in developing problem solving skills. In addition, they and the many others like them are particularly effective in leading students to practice induction in a manner similar to that employed in scientific inquiry.

Reference

Richards, J. "Modelling numbers and reality". A paper presented at the Symposium on Models of Mathematical Cognitive Development, University of Georgia, Athens, Georgia, 1979.

A CASE STUDY OF A COMPUTER ASSISSTED LEARNING UNIT "THE GROVTH CURVE OF MICROORGANISMS" DEVELOPMENT, IMPLEMENTATION AND EVALUATION.

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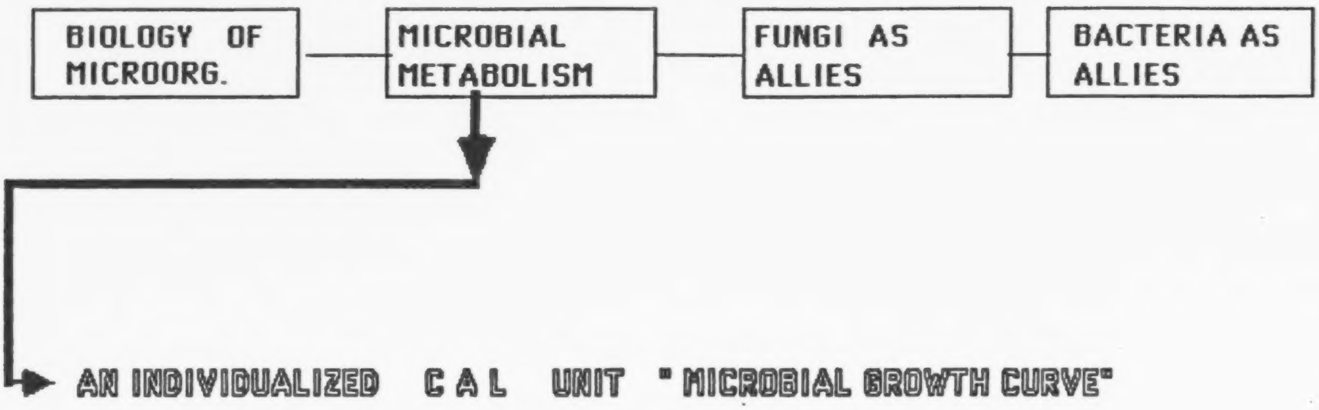
Atlanta, Georgia U.S.A
October 9-11,9
(hosted by Clayton Junior College)

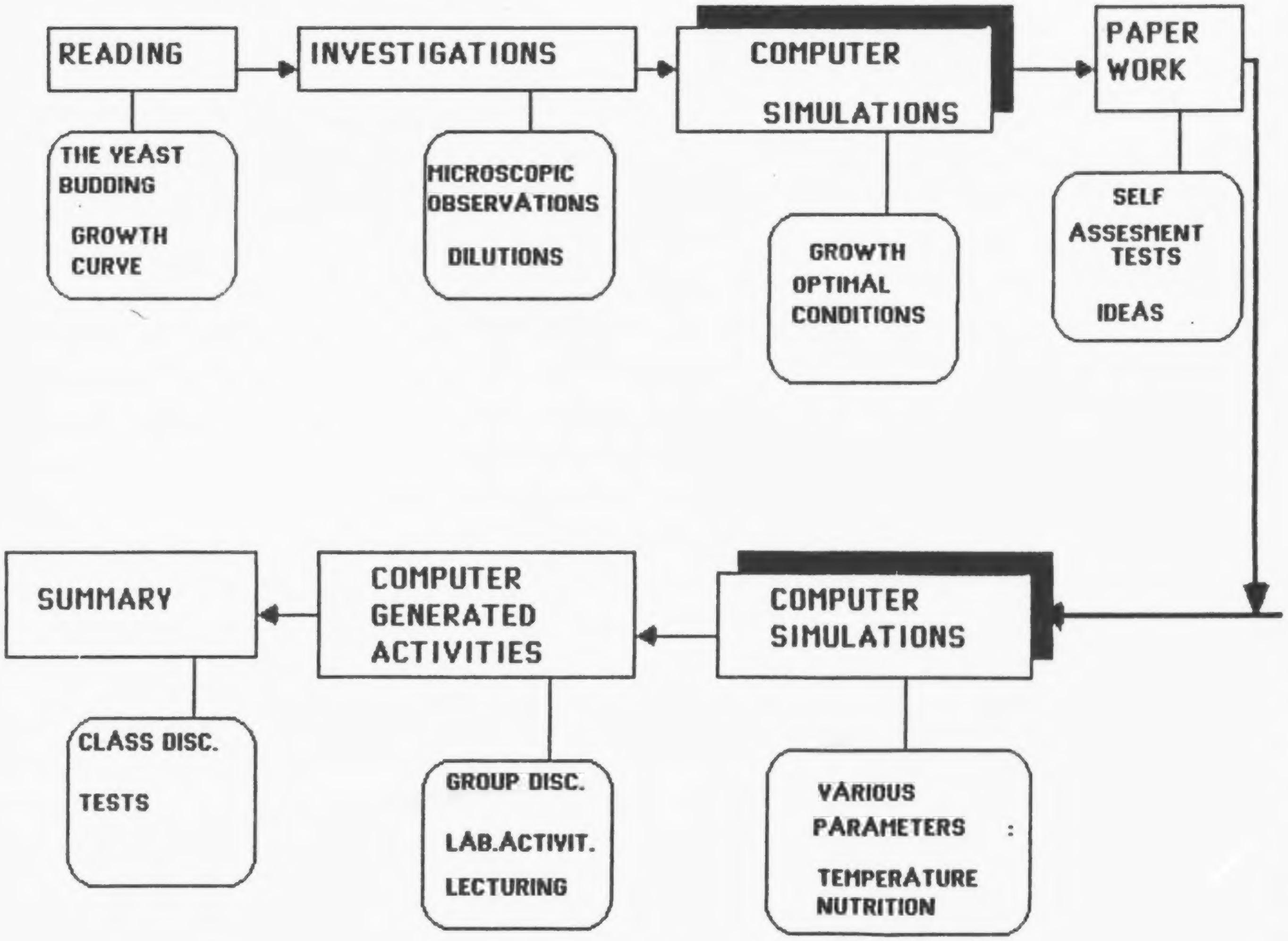
The microcomputer is used in courses for content instruction in different forms such as for test reading, simulations, games, tutorial, drill and practice. While in the U.S.A. it is known as computer assisted instruction (CAI) in England and other countries it is known as computer assisted learning (CAL). In both cases the use of the microcomputer gives us the opportunity of involving the learner actively in the learning process. Since its use is on an individual basis, it can allow students to progress at their own pace, thus having an important implication for the gifted learner as well as for the slow one. The advantages and disadvantages of CAI are mentioned by Chambers and Sprecher (1980); Long term experiments which require expensive equipment and materials can be simulated; the use of microcomputer enables remedial education, development of students' creative abilities so changes are to be expected in the classroom learning environment. As for the disadvantages of using CAI: Teachers and teachers' trainers need to adapt to new methods of working. They may not yet have the necessary expertise in using the microcomputer, a fact which may arouse fears and antipathy. The cost of the equipment; the available software which many times is not adequate according to the content and the methodology used. Bork (1984) described several factors which characterize poor software such as the inadequate use of the interactive and individualizing capabilities of the microcomputer, use of multiple choice items as weak interactive forms, text presentation, and use of pictures and materials of little educational objective purposes. Spain (1985) explains that there are two methods of preparing software. The first approach is this of the persons, who are very few but experts in the subject matter area, and are able to design instructional software and to program it as well. The second approach is called top-down programming technique and is characterized by a team effort. Graef (1984) specified that while the microcomputer may be used in existing used curriculum, in order to improve problem solving and logical thinking, if to name several high cognitive skills, unfortunately, the computer is mostly used for mastery of facts by drill and practice type software. Following the above assumptions and based on Daley and Hillier (1981), we developed a software program "The growth curve of Microorganisms" which was integrated into a modular course of an existing curriculum for 10th grade, called "The Microorganisms and Man" (Huppert, 1982). (See Flow Chart 1).

FLOW CHART 1

A MODULAR COURSE " MICRO-ORGANISMS AND MAN "


BIOLOGY OF MICROORG.
MICROBIAL METABOLISM
FUNGI AS ALLIES
BACTERIA AS ALLIES
AN INDIVIDUALIZED C A L UNIT " MICROBIAL GROWTH CURVE"

ACTIVITIES FLOW CHART


READING
THE YEAST BUDDING
GROWTH CURVE
INVESTIGATIONS
MICROSCOPIC OBSERVATIONS
DILUTIONS
COMPUTER SIMULATIONS
GROWTH OPTIMAL CONDITIONS
PAPER WORK
SELF ASSESMENT TESTS
IDEAS
COMPUTER SIMULATIONS
VARIOUS PARAMETERS :
TEMPERATURE
NUTRITION
COMPUTER GENERATED ACTIVITIES
GROUP DISC.
LAB.ACTIVIT.
LECTURING
SUMMARY
CLASS DISC.
TESTS

This paper will describe:

1) The sequence of the developmental steps of the software program for high school. 2) A short description of the program "The growth curve of micro-organisms". 3) A short description of the implementation of this software program in 10th grade high school biology, and classroom management problems.

These three parts will be presented, based on the experience acquired during the development, as well as during the implementation process in several high school classes.

1. The sequence of the developmental steps of a software program for high school

a) The basic assumptions:

One way of using the microcomputer in the classroom is to develop short software programs which can be integrated into an existing curriculum. This approach, which is known as Computer Assisted Learning (CAL), can be efficient if it is based on the following criteria:

- The topics which are chosen should be of such a nature that they either cannot be taught without a microcomputer or if they were to be taught by another instructional approach they would be presented with many gaps. (For example: long term experiments, the need of expensive laboratory equipment, etc.).
- The program should be flexible enough to be used as a short independent learning unit in addition to serving as part of an existing course.
- The program should be structured in a way that either individuals or small groups of students can study it. In this way two important instructional strategies can be used: (1) the individual learning approach, and (2) the cooperative learning approach. Both emphasize affective and social aspects of the learning process.
- The program should initiate various learning activities such as paper work, performing additional experiments, etc.

b) Developing a software program - a team task:

How to form a team of developers?

Since our approach is based on school-based curriculum, the team of developers should consist of local teachers which show the following characteristics:

- Broad knowledge of the subject-matter.
- Teaching experience which includes awareness of students' and local needs.
- Basic awareness of the computer, including basic knowledge in programming, as well as awareness of the advantages and disadvantages of a microcomputer in relation to the cognitive, affective and social aspects of the classroom learning process.

How the team works?

The developing team worked in the following pattern:

- Identification of the topic to be developed
- Forming of sub-groups for dealing with the different parts of the program, i.e. introduction, core unit, extention activities, tests, etc.
- After concluding the above steps, the formation of sub-groups which meet together and each group reported on the whole team. Discussions and suggestions followed.
- The framework of the program was suggested.
- Following the interaction of the sub-groups the learning program was handed to the programmer who prepared the first draft of the software.
- The first edition of the program was submitted to the team for discussion, changes, editing, revising, etc. This stage was repeated several times.

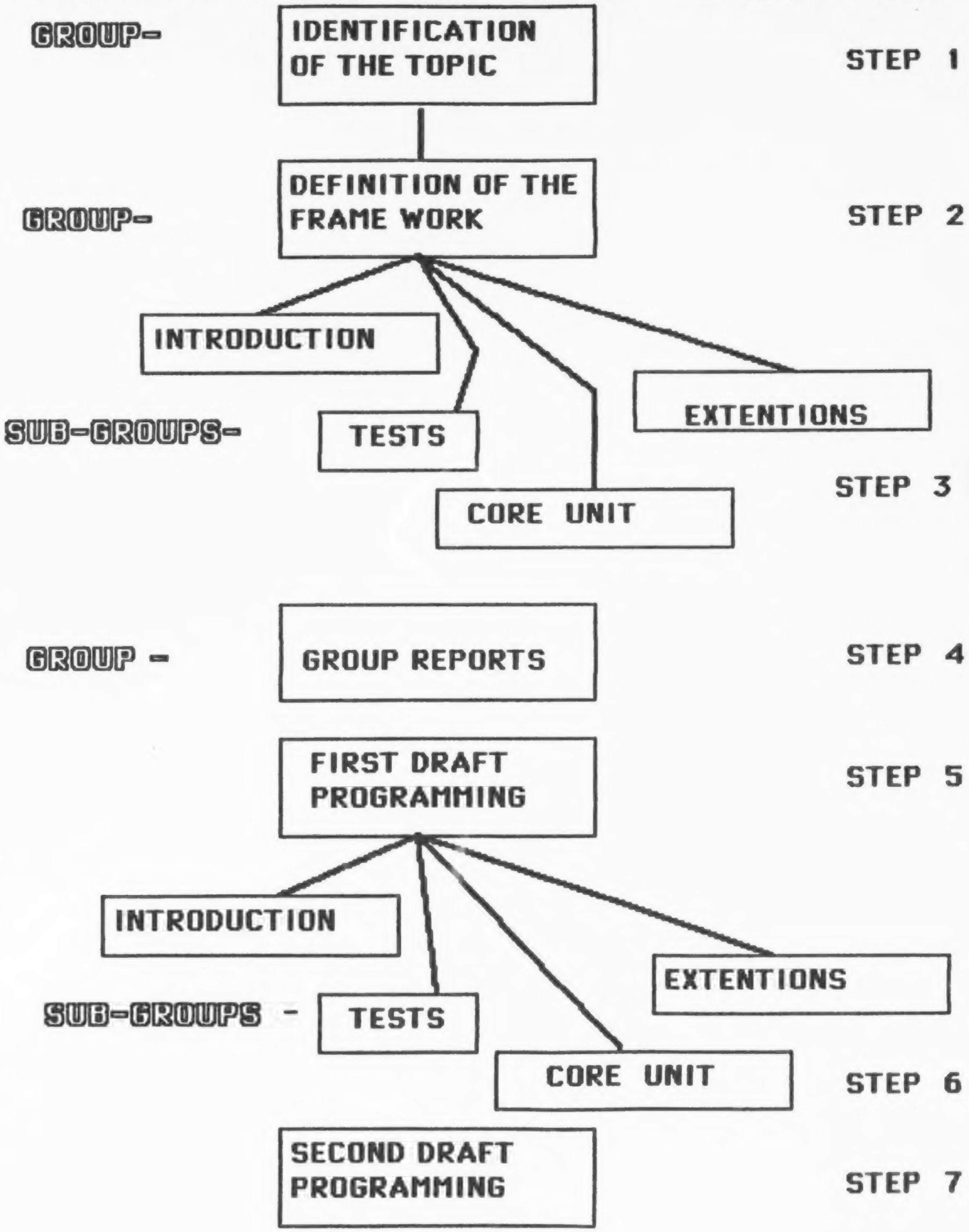
All the steps described above are presented in Flow Chart 2.

2. A description of the Software "The growth curve of the Microorganisms" A simulation

The Biology of Microorganisms is one of the important subjects taught at the junior college and high school level. While the cell structures and physiology of microorganisms can be studied in the regular course sites of the classroom and laboratory work, some other aspects cannot be always taught because of different reasons. One of the aspects neglected is the issue of the "Growth Curve", since its' study requires several long term laboratory sessions, materials and equipment which is not always available. The study of this topic is important, since it enables students to investigate the nature of the growth process of microorganisms and also to study about the impact of various environmental variables such as temperature, nutrient concentration, etc. on the population growth.

FLOW CHART 2

DEVELOPING A SOFTWARE PROGRAM – A TEAM TASK


GROUP–
IDENTIFICATION OF THE TOPIC
STEP 1
GROUP–
DEFINITION OF THE FRAME WORK
STEP 2
INTRODUCTION
SUB-GROUPS–
TESTS
EXTENTIONS
CORE UNIT
STEP 3
GROUP –
GROUP REPORTS
STEP 4
FIRST DRAFT PROGRAMMING
STEP 5
INTRODUCTION
SUB-GROUPS –
TESTS
EXTENTIONS
CORE UNIT
STEP 6
SECOND DRAFT PROGRAMMING
STEP 7

Our goal was to use the microcomputer for experiment simulations as a tool for overcoming the shortage of time, material and equipment and to use it in the same time for high cognitive level activities in the instructional process. Simulating experiments requires students to exhibit specific skills such as skills of decision making and problem solving.

The modular course included classroom instruction in which students learned the characteristics of the microorganisms, such as their structure, the life processes and other related facts. The students became acquainted with the definition of population, generation time, lag phase and exponential phase of the growth of microorganisms.

In laboratory work students examined yeast cells under a light microscope, studying their reproduction and budding process and learnt how to count cells with a haemocytometer. Students learnt also how to dilute yeast cell culture and how to calculate the actual cell number in the sample.

The simulation program made possible to perform many "experiments" in a short time and to follow the influence of various factors such as temperature, nutrient conditions etc. on the growth curve in a very short way.

The microcomputer simulation was integrated into the sequence of the learning activities in the classroom and laboratory, which were performed at the students' own pace.

The following steps were studied in the computer simulations:

a) students were required to feed data into the computer related to the initial conditions of the yeast cells growth. The data included different temperatures, different nutrient concentration and different initial number of cells of the culture.

b) students counted the number of cells as they were exposed on the screen in a frame of a simulated haemocytometer under various growth conditions as mentioned above.

c) students were asked to plot the results of the population growth in order to form a graph of a growth curve on the screen, and were required to analyse the results obtained in the simulation program by using a worksheet. The concepts of a population growth curve such as the lag, log stationary phase were explained in the worksheet and helped the students to interpret the graph results.

In the following step students were required to count the initial yeast cells sample again, which was kept at a constant temperature. The students had to define (with the use of the graph obtained earlier) the growth phase of the original yeast culture.

Computer Generated Assignments - Within this frame, students were required to apply the growth curve pattern to other populations and to hypothesize the impact of external factors on a population growth curve. Then the hypotheses suggested in the above step served for classroom discussion.

The CALU included a self-assessment test with twelve multiple-choice questions. The following procedures were sequenced in the test. When the students chose a wrong answer they were not able to try for another answer or to pursue a new question. Instead, they were given remedial instruction for the particular knowledge regarding the question. Following this reiteration the program allowed them to continue and to try to answer again. If after this second attempt they succeeded to select the correct answer the program allowed them to pursue the following question. In case of a mistake at the second attempt the student was asked to consult the teacher.

3. The Implementation Process of the CAL Program in the Classroom

Three factors should be considered in relation with the implementation process:

1) The classroom setting: The laboratory classroom setting was made suitable for individualized or small group learning. The computers were situated in different corners of the laboratory and so was the necessary equipment. No special lessons were used to work on the simulation program and therefore it was studies in a regular biology lesson held in the laboratory classroom.

2) The student: The program "Growth curve" was used as part of a modular course "Microorganism and Man". This course was based on self-paced student progress. The students worked on different assignments at the same time, progressing at their own pace. The simulation program "Growth Curve" was integrated into the learning process of the module as one of the various assignments. Three Apple IIe microcomputers were available in the laboratory and the students worked independently (or in small groups) on the simulation program.

3. The self-paced progress enabled the efficient use of the computer time. In Flow Chart 3 students self-paced activities are presented.

3) The teacher: The self-paced study of the simulation program urged certain changes in the teachers role in the classroom. The teacher was now expected to be able to manage a more complicated learning structure and to be able to manage successfully the use of a microcomputer. The teacher was acting more as an advisor than as a source of knowledge. During the classroom discussions held as a summary of the simulation program the teacher was acting as a motivator to help the students to gain an overall picture of the programs' concept - "The population growth curve". These activities are presented in Flow Chart 4.

References

1) Bork, A. (1984) Education and Computers: "The situation today and some Possible Futures". T.H.E. Journal, 92-97

2) Chambers, A.J. & Sprecher, W.J. (1980) Computer Assisted Instruction: "Current Trends and Critical Issues". Communications of the ACM. June, 1980. The Association for Computing Machinery.

3) Daley, M. & Hillier, D. (1981) Computer simulation of the population growth (Schizosaccharomyces) experiment. Journal of Biological Education, 15,4,266-268.

4) Graef, J. (1984) Teaching Science with Computers. The Physics Teacher, October, 430-436.

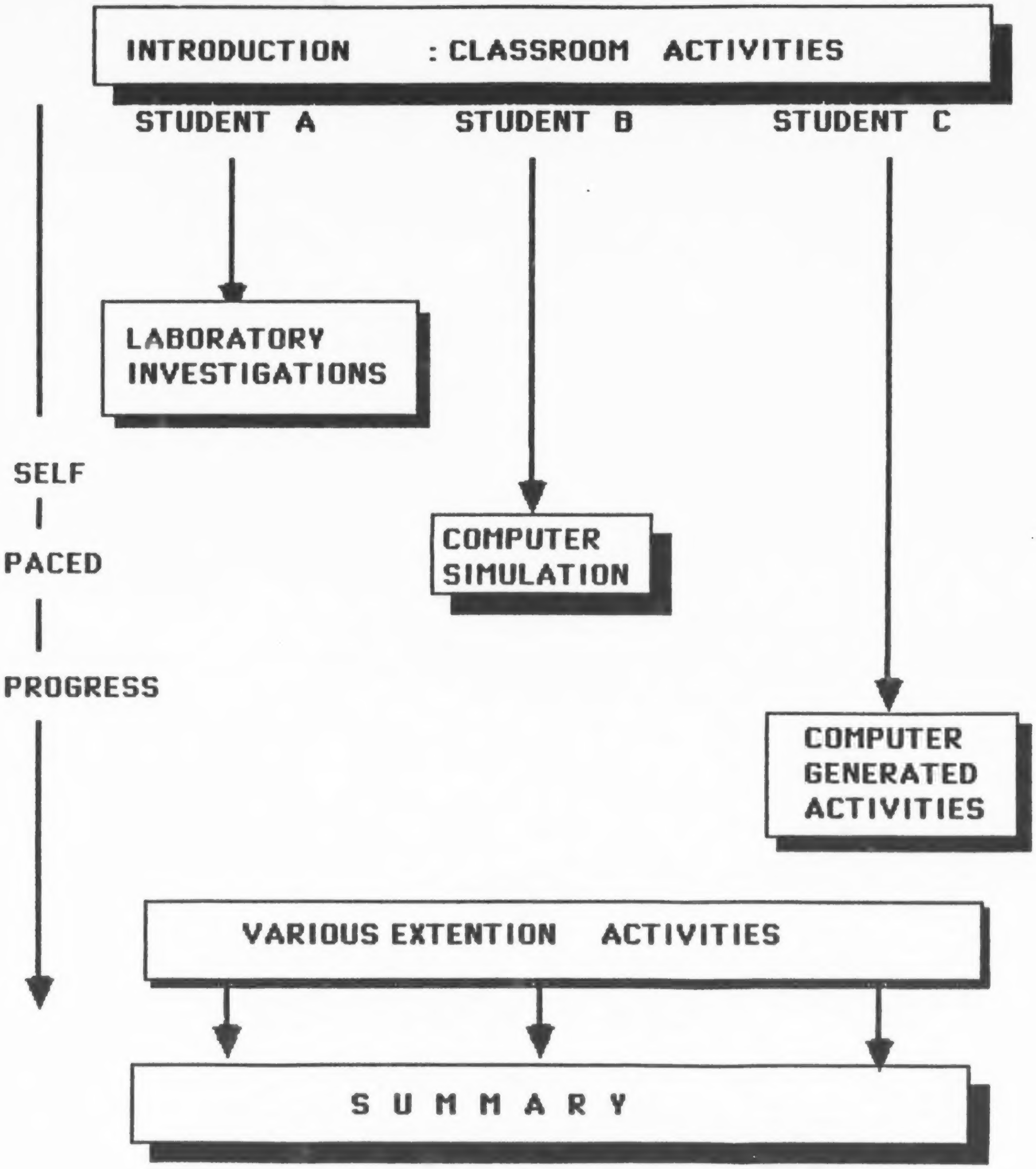
5) Huppert, J. (1982) The Microorganisms and Man. A Modular course in Microbiology. Ph. D. Dissertation. University of Bath, England.

6) Spain, D.J. (1985) Why isn't there more good instructional software? The American Biology Teachers, 47,6,378-380.

FLOW CHART 3

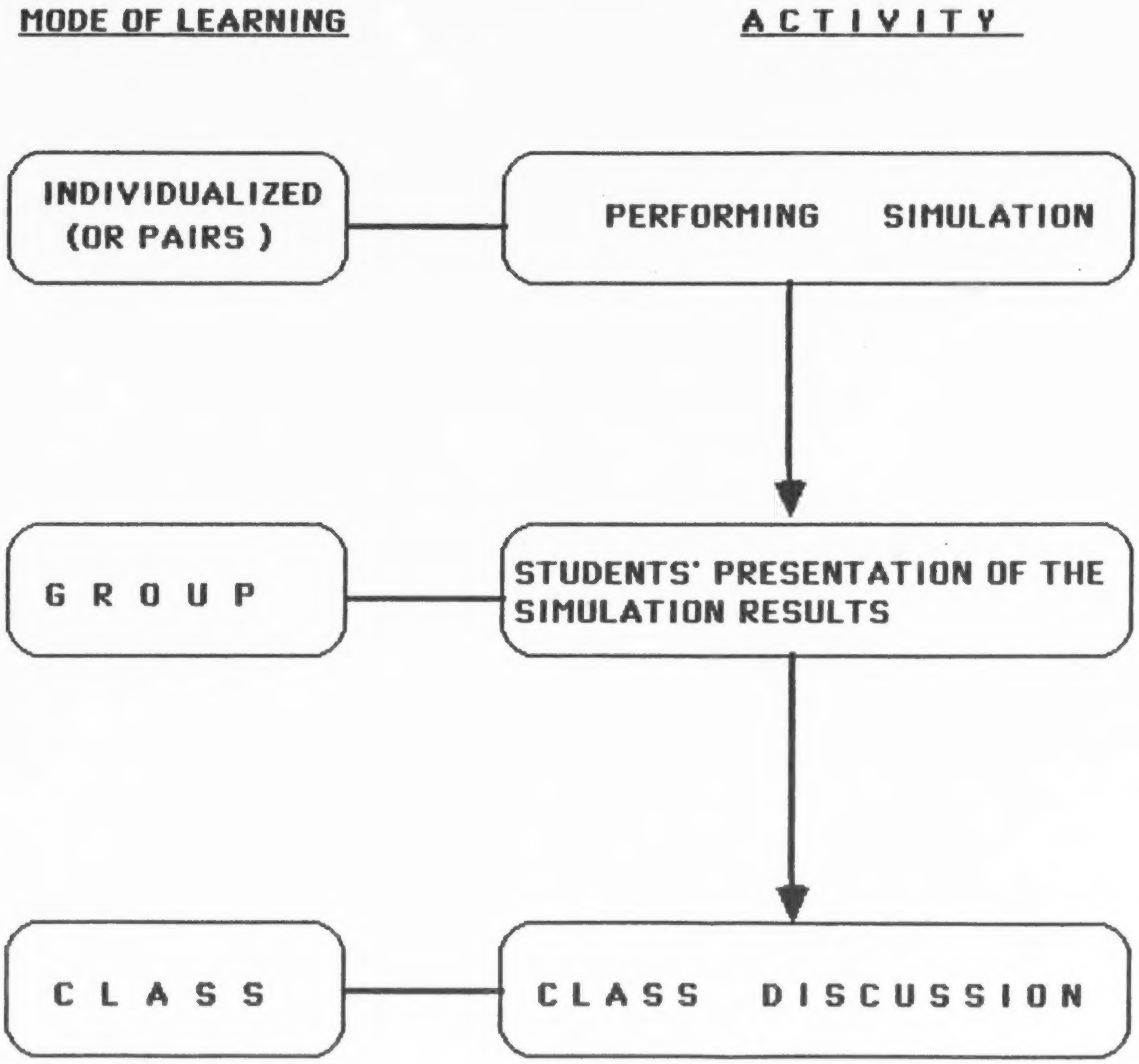
THE CLASSROOOM MANAGEMENT OF AN INDIVIDUALIZED C A L UNIT IN BIOLOGY

THE SELF-PACED PROGRESS ENABLES AN EFFICIENT USE OF THE COMPUTER TIME


INTRODUCTION : CLASSROOM ACTIVITIES
STUDENT A
STUDENT B
STUDENT C
LABORATORY INVESTIGATIONS
COMPUTER SIMULATION
COMPUTER GENERATED ACTIVITIES
SELF
PACED
PROGRESS
VARIOUS EXTENTION ACTIVITIES
SUMMARY

FLOW CHART 4

LEARNING MODE OF THE COMPUTER COURSEWARE
THE GROWTH CURVE


MODE OF LEARNING
ACTIVITY
INDIVIDUALIZED (OR PAIRS)
PERFORMING SIMULATION
GROUP
STUDENTS' PRESENTATION OF THE SIMULATION RESULTS
CLASS
CLASS DISCUSSION

A Non-Traditional Approach for Improving the Writing Skills of College Students

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Individualized Instruction Conference,
Atlanta, Georgia - October 9-12, 1986.

Improving Student Learning Outcomes: Nurturing Product Quality Through Student Writing for Publication.

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In the current climate of declining student enrollments, shrinking educational resources, and the futuristic rush to embrace high technology, which is reshaping society, colleges and universities are facing a host of new challenges in the post-industrial era.

In a manner of speaking, the future is in the educated minds of today's students, and how well institutions of higher learning heed the call for curricular reform with innovative, timely and promising programs having tangible educational outcomes will these measures affirm the symbiosis between academia and the social, political, and economic system.

One simple, but irrefutable fact is we live in a world of change, and in this context, must plan and act on the basis of change--change that is on-going, constant, and unpredictable; change that is both cyclical and structural, fluctuating in size, direction, or in rate of development.

The point is, that given this scenario, if America's institutions of higher learning are to survive and remain viable in the next century, they will need to re-evaluate their mission statement, and curricula, because educational planning must reflect an abiding concern for supply and demand in current and future work requirements. Curricula reflecting strategic planning of this nature represents the best defense against the fickleness of change in a transforming society.

Maximizing Instructional Resources

From a pedagogical perspective, meeting demands of students in an evolving society, in terms of instructional quality and product quality will be with some difficulty, given budgetary constraints and academic pressures on faculty. But these are challenges common to higher education throughout its history and even more so in recent times.

In any event, our task, like change, which is on-going and constant, is to create a ripple of influence that will be felt in the lives of students years after graduation.

The bottom line, of course, is the degree to which teaching-learning outcomes have tangible results, are responsive to the goals, capabilities, background and priorities of each student, and to the skills required for an economy shifting away from the old "smoke-stack" industries, and toward service and "information-based" industries.

But, we should be reminded that the historic purpose of higher education is the obligation to provide opportunities for global and unitary experiences out of which emerges the truly educated person who is comfortable in his/her existence, who understands (at least to a reasonable degree) the physical world, the social environment, and the moral forces that shape and influence us all in a complete way; and who has the skills to evaluate the meaning of his/her world, even to the extent of visualizing how existing conditions can be improved for the better.

As these possibilities illustrate, the truly educated person is cognitively organized to use knowledge already possessed, and use that knowledge, in conjunction with new knowledge, to generalize, draw comparisons, sort out logical fallacies in arguments, and formulate reasoned positions on social or ethical issues, thus facing the future with confidence and excitement.

Prologue

This paper is a descriptive report on the author's efforts in mediating some of the issues/needs addressed herein. The "Project" entailed student writing for publication. The pedagogical focus was to encourage students to identify alternatives to the traditional term paper or, to be more specific, teacher-sponsored topic writing assignments, and to offer support while students act on what we perceive to be a unique growth-promoting opportunity.

We tried (although we are not certain, we always succeeded) to focus student attention on their life/professional experiences, and the organization of thought behavior and ideas as coherent themes. We sought to foster in students analysis of their own thinking for understanding and appreciating creative processes of reasoning for examining those values and principles important to the quality of life.

Three basic ideas guided our efforts. First, and foremost, the idea that the student is motivated to learn. Second, learning is viewed comprehensively, since understanding and the integration of new information into one's beliefs system is inclusive.

Third, learning experiences are oriented towards both cognitive and affective learning needs. Such an orientation enhances the relevancy of the learning and serves to develop the learner in a wholistic manner.

The project had its genesis with acceptance of the notion that faculty must change the way it approaches the learning process. In considering what and where to change, we looked at our years of experience with teacher-sponsored topic writing assignments, and the intended learning results. We concluded, product quality of traditional term papers to be less than satisfactory.

Whether the explanation for unsatisfactory quality can be attributed to student perceptions of teacher-mandated writing assignments as "busy work," intellectually unredeeming or institutional requirements long bereft of purpose is difficult to assess, in the absence of systematic study. This fact not withstanding, we concluded that improving the product quality of written work was an essential educational priority.

Because the written expression of ideas and the critical thinking skills associated with writing are fundamental to all disciplines, every student should be competent in writing clear, coherent prose. And since an information society demands proficiency in writing, encouraging student writing for publication was like breathing fresh life into the teaching process generating, we believe, a revitalized quest for learning.

The bottom line was not so much the facilitation of conditions for stimulating educational renewal, as was our focus on encouraging student writings for publication, within the framework of course requirements. Admittedly, this approach was an implicit criticism of traditional teacher-mandated term papers, a form of learning activity, some researchers would describe as passive learning with questionable learning outcomes.

The educational goals were simple and straightforward. We sought to promote intellectual abilities by setting high expectations in performance. These were not in our estimation unrealistic expectations, but expectations slightly above the students' current abilities. We were convinced that people tend to live up to the demands placed on them. And finally, the approach was thought-focused because we deemed it essential that students, across the disciplines, develop the thinking and writing skills essential for dealing with the complex and challenging problems in their future work situation.

The importance of writing competency cannot be overstated. Studies have shown that individuals with writing skills are often the best students and the most successful professionals. Sadly, most people have no idea that their lack of writing proficiency is holding them back.

In order to accomplish our task, we needed a rationale enabling students to perceive rewards from self-directed cognitive experiences that they could value, and integrate into their future occupational skills. This level of performance we believed would trigger internal motivation for increased learning across the curriculum.

We found a rationale in the fusing of career and academic training. We rationalized that the prerequisite cognitive capacity for developing Writing Skills could be achieved if we linked such efforts to the idea that 1) contributing to the literature from which one has received his/her academic training is a professional obligation and responsibility, and 2) since every academically trained person should at some point in their career have something important to report evolving from their professional/occupational experiences, cultivation of this attitude and the development of writing skills should be a teaching goal in graduate school.

Lack of Writing Skills Impacts on Discipline

Whatever field of endeavor students are preparing for--commerce or industry, science or the arts, philosophy or education or government and statemanship, investment of resources in fostering writing skills, exposing them to the challenging business of doing scholarly work, and promoting critical reasoning skills constitutes the highest priority task, as we prepare for the 21st century, only 14 years away.

Such a commitment is the only or at least the best way to pass on scholarly traditions, promote creativity, and guarantee not just professional development but the very future of the discipline.

In our judgment, this is the most fundamental intellectual legacy we can give to our students.

For indeed, no discipline, be it medicine, law or accounting, can hope to retain its stature, prestige and credibility, in the absence of insightful and timely information that keeps close to the realities of the field.

If students are deficient in writing skills, they will be singularly handicapped in discharging their indebtedness and obligation to their discipline.

It has been said many times that we use but a small percentage of our potential. Less than 25%. I am reminded of William James who said that human beings live too far within self-imposed limits.

Our project was designed to help students use that untapped 75% so that they can discover and fulfill their potentials.

Writing For Publication as an Option

The program was successful, in part, because it was made clear to the students that writing papers for publication was an option. We frankly acknowledged wih no disrespect to the class the realization that probably most of them lack the requisite skills for publication. We insisted, however, they were capable of writing good, short and simple declarative sentences expressing an idea. And it was this potential that was to be exploited with creative and imaginative thinking. Originality was stressed as a demonstration of the individual's capacity to think through ideas and conceptualize them in a meaningful frame of reference. In orienting the students to the assignment, they were cautioned, serious writing is always preceded by a search of the extant literature to discover if what one has to say is truly a contribution to the literature. Since the object of written work is to inform, we stress students should know what others before them have said about the same subject. To ignore past contributions, we admonished, is to impair the scholarship of their efforts. Lesson-wise, the students were told when a person says, "I know what I mean, but can't express it," the individual most likely does not know what he/she means. The individual still has some thinking to do. As the individual begins to pull his/her thoughts together, especially by learning to write in short, simple declarative sentences, the person will clarify his/her own ideas and for some individuals, this is an excellent method for developing understanding of subject organization.

We made clear in the orientation, which was usually the initial class meeting, our strong belief that the acquisition of attitudes and understanding of the importance of writing proficiency cannot be left to chance. We further believed that in the future employment, their written work will be judged primarily on its contents, that is, on the value or quality of the information and ideas it expresses; that careful organization and clear, concise expression of content would be essential if the intended reader is to grasp the full meaning. Thus, the mental processes on which written expressions of ideas depend were reviewed. These included: 1) Generalizations: pulling together the common elements that relate specific examples, ideas or instances to one another; 2) Inferences: extracting the meanings that are implied but not stated explicitly; reading between the lines; 3) Analysis: examining parts of the whole, such as causes, effects and processes; 4) Synthesis: developing ideas into new relationships or contexts: creating, organizing the parts as in a puzzle; 5) Evaluation: making judgments according to a criterion: is it concise, readable, organized. Our message to students emphasized that in order to be marketable and successful in today's world, they will need to experience, if only from a market-centered perspective, the rigors of serious writing. This means: 1) developing the capacity to apply to new context the knowledge gained from classroom learning, readings, life experiences and library research; 2) developing the ability to draw conclusions, as opposed to simply restating or summarizing the works of others; 3) being able to state a thesis clearly and support same with reasoning and evidence; 4) being able to organize the parts of a paper in an orderly sequence, governed by a controlling purpose that is clear to the writer, with paragraphs and subsections containing their own internal organization; and 5) being able to adapt what one writes to the needs and expectations of the intended audience, whether it is one's peers, other scholars in one's discipline, or the general public.

Angle of Approach

At the outset, we recognized students will have various needs and abilities regarding this assignments: 1) those students who have the ability to write competently but who might need encouragement to write for publication; 2) those students who lack the intrinsic drive and self-confidence and might therefore require some market-force persuasion, reassurance and ego support; and 3) those students who for a variety of reasons would opt for the traditional term paper requirement. We were convinced, therefore, that students would need to be inspired, challenged or nudged into writing a mature and publishable paper with all the confidence that makes it possible. As an aside, I would point out that published papers as learning outcomes are significant indices of teaching effectiveness. This was an explicit goal.

With respect to students' probable reaction, we anticipated initial resistance if not outright dismissal of the challenge to compose articles for professional journals. Our strategy in minimizing or disarming their arguments took the following approach, which proved to be effective.

1. Students were initially oriented on their soon-to-be professional status with all the "rights, privileges and immunities thereunto appertaining,"

including the obligation we argued in contributing to the literature of their respective discipline. It was made clear that this is a responsibility all members of a profession assume: that only as the existing body of knowledge undergoes constant review and revision, as new ideas and experience emerge from practice, can the discipline maintain its usefulness, relevancy and credibility.

2. The advantages and benefits of serious writing were discussed in great detail. We noted, for example, the immense pride in seeing one's paper published in important journals alongside those of well-known scholars; the prestige and status accruing therefrom; its value factor in enhancing one's resume; the demonstration of one's ability to pursue doctoral studies. (Several of my writer-students have gone on to earn doctorates.) Lastly, we stressed the equally serious commitment to writing as a significant mesure or component of professional leadership. Publication of one's views, we observed, demonstrates ability to articulate issues, which is an important index of leadership.

3. For the timid, unsure student, our strategy involved encouraging them to "test the waters" by writing an "op-ed" piece, a short newspaper article or letter to the editor of their local newspaper or to a news journal (e.g., Time, Newsweek, U.S News and World Report) in response to a news article. This approach had a two-fold purpose: 1) as a result of their "article," the student should feel more self-confidence, more comfortable with the ensuing demands of a larger, more complex paper, and better able to cope with the rigors of serious writing; and 2) the student would be encouraged to use the published statement as the basis for a more developed paper with the usual references, footnotes and bibliography. It should be noted, several students have found this prescription helpful as a starter, perhaps, because it enabled them to sharpen their understanding of short, concise articles that communicate ideas. As a tool it was most effective.

4. Since lectures are the predominant method of instruction, and it is generally recognized that the educational yield from lectures is generally low, we sought to increase the yield by granting students a wide latitude in topic selection, including topics indirectly related to course content. Factors such as students' age, maturity, years of experience, discipline (my students represent a variety of fields, e.g., teaching, health profession, business and social welfare) and topic interest had to be considered, giving the heterogeneous makeup of the class and the unusual requirements imposed on them. In general, we sought to strike a dynamically important note of inquisitiveness by calling to students' attention (especially those with years of professional experience) the yet unsolved problems and issues in their field and encourage them to re-examine the fundamental tenets of his/her discipline.

In this connection, the clinical value of this approach was that it made more palpable our assertion that as professionals already toiling in the "vineyards," there is much they can harvest in conceptual and theoretical questions culled from "hands-on" experiences. This strategy also helped to facilitate the breakdown of powerful anxieties and/or frozen attitudes. More importantly, it helped to persuade those students wavering in their choice between a term paper or a more substantial paper for publication. As a further inducement and source of support, we establish a working relationship with the college workshop, a remedial program sponsored by the English Department for assisting students with their writing problems.

Essay-Type Articles Stressed

The students were instructed to write essays and not research-focused papers, the requirements of which we considered too time-consuming and perhaps outside the individual's level of experience. They were advised to examine the college library's holding of journals and periodicals and select a journal they felt comfortable with for submission of their manuscript. They were further instructed to comply with the journal's editorial requirement and not to follow the traditional term paper organization and style. We discussed protocol for submitting manuscripts, and the writer using his experience as a consulting editor to a journal, the juried/review process was explained as was the appropriate information for the cover letter. They were also forewarned of possible rejection and the psychological let-down ensuing therefrom. We spoke at great length assuring the class that the best of authors have experienced editorial rejection, and the writer candidly shared with them his experiences at failure. At the same time, we reminded the students that a rejection was not per se a failure but a lesson in writing, since it is a common practice for the editor to offer some comments or reasons for the rejection. In some instances, we reminded the class, rewriting the paper with the editor's comments or suggestions in mind, and resubmitting it can often result in its acceptance.

Finally, the class was assured their paper would be graded on the same basis as a term paper. This statement was important lest those students opting for the traditional term paper perceive themselves in a disadvantaged position at grade time.

As an aside, whenever a student sought independent study, we found this an excellent opportunity to tout serious writing. While the student is allowed to fashion his/her own course of study, invariably we would convince the student that a paper of publishable quality should be an outcome of independent study.

Conclusion and Summary

The effort to raise graduate students' writing to the level of competency was in large part attributable to student motivation to learn. We simply created on environment that allowed self-directed learning to occur. Students were giving the primary responsibility for setting learning goals and selecting their learning experiences.

The resulting choice of the students has clearly the character of professionalism as the evidential material suggests. Student papers have been published in such diverse journals as Adult Leadership, NAD Broadcaster, Journal of International Association of Pupil Personnel Worker, Today's Education, The Clearing House, Counseling and Values, The Guidance Clinic, EAP Digest, Cimmaron Review, The Independent School Bulletin, Adult Education, Teacher Paper, N.J. School Board Notes, School Leader, NJEA Review, Journal of Business, Journal of Health Education, and Tempo (Journal of the New Jersey Music Educators Association).

It should be apparent from the above the correctness of the decision to permit a wide latitude in subject choice. Student evaluations at semester's end indicated a worthwhile educational experience. One unanticipated but welcome outcome was students' new-found respect for published articles. Not only had these students learned to write proficiently, and in the process raise their self-confidence, but they also learned that to write is learning to think. And, perhaps, the most striking instance of success was the affirmation of students to continue writing for publication in other classes in lieu of traditional term papers. This was true even for those students whose papers were not accepted for publication. This unique teaching approach has the potential for a new model in student learning outcomes. As the results demonstrate, student publications, as a measure of cognitive learning experiences, are an attractive alternative to the traditional teacher-assigned term paper. One further thought needs to be shared. Obviously, a number of factors contributed to the success of the program. One that stands out is the following. Students find credibility in the writer's efforts, when they know that he has published. As a strategy, I would distribute copies of my articles as well as those published by former students. Each year, I would try to publish one or two articles so that my efforts would represent for students a model, a standard of sorts for much needed encouragement and support. Thus the students recognize I would not demand from them what I am not prepared to demand of myself. I am certain this has been an important factor in my success to date.

The Integration of Skills and Content

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ABSTRACT OF
"THE INTEGRATION OF SKILLS AND CONTENT"
by Richard Miller

Just as students who are expected to absorb content without the requisite thinking skills often fail; students who attempt to master reasoning skills without appropriate content also fail. There are three possible approachs to the use of content in skill instruction: the CONTENT-FREE APPROACH, THE DIVERSE CONTENT APPROACH, and the UNIFORM CONTENT APPROACH.In this paper I argue that the best approach is to integrate skill instruction with DIVERSE CONTENT.

Every decade there seems to be a renewed wave of concern about American education. In the wake of early Soviet space exploration there was a call for renewed emphasis on the quantitative disciplines. This brought us the "new Math." In the sixties we discovered that we were killing the creativity of our children and that we must in consequence either deschool or freeschool. In the seventies we discovered that Johnny can't read and we went "back to basics"--drill, rote memorizations, and discipline.

Each of these waves of concern have been followed by a period of reaction. The movement of the 80's is to improve the thinking skills of our students. Let us heed the warning of our recent history. There is the same potential for creating a huge amount of smoke and very little fire now as there was in the 60's and 70's. I fear that the end result may be that "thinking skills" will be defined so broadly as to encourage educators to merely redescribe their curricula and methods in the now fashionable jargon without making any significant changes. On the contrary I will argue that changes are necessary both in the curricula and in instructional methods.

The need for an overhaul of our educational system is apparant. Our students are not learning how to think as well as they might. For example, a study comparing Japanese and North Carolina students, grades 7 - 9, found that three times as many of the Japanese students (35% as compared to 10%) possessed formal reasoning skills.[1] Unless we are to conclude that the Japanese are genetically superior to North Carolinians(!), we must suppose that either the home and/or school environment of the Japanese students was more favorable to the development of those skills. Nor are these skills unimportant. They correlate with success in most areas of the curriculum.[2]

On the importance of thinking skills virtually all are agreed. There are, however, deep differences about what we should do about it. These differences are often expressed, unfortunately, in these terms: Should we establish special courses to teach thinking skills, OR should we integrate skill instruction into ordinary content courses? Note that this is a classic fallacy--it is a false dilemma. There is no reason why we should not, and as I will argue, very good reason why we should do both. There needs to be an overhaul of our manner of teaching content so that thinking skills are used and reinforced during this process. There is also a need in our curriculum at present for courses whose primary focus is the improvement of thinking skill. Worse, the second horn of the dilemma is sometimes taken to mean that present curricula and methods are quite acceptable, that the problem, if any, is with poor teachers, that good teachers have taught reasoning skills all along.

The comparison of thinking skills and writing skills is instructive. The university curriculum quite properly requires that all students take composition courses taught by specialists in the instruction of writing. These composition courses are not "content-free," typically the students must read essays and write about them, but the emphasis of the course is on writing. The existence of these writing courses does not eliminate the need for essay exams and papers being integral parts of other courses in the curriculum. Indeed, students will not learn to write well unless they are exposed to both types of instruction. I argue that we need to approach thinking skills the same way. There should be specialized "critical thinking" courses, as well as attention to thinking skills integrated into content courses. Just as writing across the curriculum SUPPLEMENTS composition courses, thinking across the curriculum SUPPLEMENTS applied logic courses.

In discussing the relation between content and skills we need to distinguish between three, not two, approachs to the use of content in the examples which are chosen to illustrate particular thinking skills. The three possible approaches are: CONTENT-FREE, UNIFORM CONTENT, and DIVERSE CONTENT. CONTENT-FREE skill instruction is perfectly abstract. In CONTENT-FREE instruction, and pure symbolic logic is a good example of this approach, a particular form of thinking is described abstracted from all content. Pure abstract thought is intimidatingly remote from normal thought processes and generates a great deal of resistence on the part of average students, though it is probably the most efficient way to impart these skills to high achievers. It is little wonder that many instructors believe that thinking skill instruction will work better with some content. But failure to distinguish between UNIFORM CONTENT and DIVERSE CONTENT has lead some to conclude that skill instruction can use the same content normally presented in some particular subject. On the contrary I would like to suggest that we need to use DIVERSE not UNIFORM CONTENT to teach thinking skills.

Instruction in the content of specific disciplines requires the possession of thinking skills, skills which are intimately tied to mastery of language. To illustrate this dependency I need only point out that cognitive psychologists have long known that people store information as propositions rather than as sentences. For example, students listening to a lecture are very unlikely to remember the actual sentences that were uttered. Instead, these sentences are interpreted into propositions and it is the propositional content that is stored. This interpetation of sentences into propositions is automatic. But what if a student systematically encodes the wrong propositions when listening to sentences? Obviously, communication breaks down. Data indicate that average college students do encode the wrong propositions even with remarkably simple sentences. Practically half of a random sample of college freshmen misinterpret sentences using the word "only."[3] Significant minorities interpret statements of class inclusion are asserting class equivalence. Many students misunderstand the word "unless." Imagine giving a lecture and being forced to avoid the use of words like "only," "unless," "if," "all," etc. It is clear that content instruction suffers for the lack of these skills.

It has seemed plausible to many that just as instruction for content requires skills, instruction for skills also requires content. Those who have argued this position have not, however, made the distinction between UNIFORM CONTENT and DIVERSE CONTENT. I argue that it is the latter and not the former which will best promote the acquisition of truly general thinking skills, i.e.

skills which transfer to a wide variety of content areas. Bob Marzano and the McREL Program seeks to add skill instruction to ordinary content courses. John McPeck argues that traditional content courses are both necessary and sufficient because there are no general thinking skills.[4] Both are convinced that specialized courses in thinking skills are not desirable on the grounds that content is required. I agree that some content is required for the optimal instruction of average students (I persist in thinking that for the best students CONTENT FREE instruction is the most efficient.) But neither Marzano nor McPeck seems to be aware of the distinction between UNIFORM CONTENT and DIVERSE CONTENT. It is the former not the latter which they would rely on. I argue that it is the latter and not the former that we should incorporate into courses.

An example of DIVERSE CONTENT would perhaps be helpful at this point. As I mentioned above nearly half of all college freshman have trouble understanding sentences of the form: Only A's are B's. They tend to interpret such statements as asserting that A is a subset of B instead of the converse: B is a subset of A. For the purposes of both testing and instruction I use examples of statements of this form with DIVERSE CONTENT. Three examples are: Only Representationalists are Impressionists (content: Art History), Only Materialists are Functionalists (content: Philosophy), and Only bilaterally symmetric species are chordates (content: Biology).

We ought to be aiming at providing our students with truly general thinking skills. Formal logic is the study of patterns of reasoning that are content neutral, that is, the reliability of the argument is independent of its content. To put this point another way, a good argument form is good no matter what subject matter is used to fill the form. Instructing students in the abstract forms themselves, devoid as they are of all content, has its problems. On the other hand, getting students to grasp the underlying form by presenting multiple instances of the form filled in with different contents is a pedagogically successful strategy. Not only that, students who come to grasp the patterns in this way see at once that the pattern is applicable across the curriculum. This is one powerful way of fighting the tendency which students have to compartmentalize their knowledge. By instructing them in this way we are actually helping them to see connections between the disciplines.

Thus, as I see it, the distinction between content and skills courses is merely one of emphasis. Both need to make use of DIVERSE CONTENT. A typical content course in a discipline will present content which is for the most part uniform. Diversity will be introduced only when some particular thinking skill is being highlighted. In a skills course, on the other hand, skills are always being highlighted so the content is incidental.

I am in full agreement with those who, like Bob Marzano, seek to integrate thinking skills into the usual content courses. Merely adding specialized courses in thinking will not do the trick. But this does not mean that there is no need for specialized courses, any more than Writing Across the Curriculum obviates the need for English Composition.

The current curriculum does not succeed in developing thinking skills, and this will not change merely by making instructors cognizant of the need. Teaching thinking skills is more difficult than it seems. To expect instructors to successfully inculcate these skills as a by-product of normal instruction is probably expecting too much. However, to expect their efforts to succeed at supplementing and reinforcing lessons learned in a specialized course devoted to thinking skills is quite reasonable. The advantage of such specialized courses is that the instructor is able to specialize in this difficult field and over the years builds up a body of experience and course materials which he has found effective. Also concentrating on these skills in a single class allows instruction in one skill to reinforce instruction in others. Thinking skills are interconnected and devoting primary attention to these skills in one semester permits a body of skills to build upon each other in a way that is unlikely when skills are taught isolated from each other.

Instructors who are sensitive to the need to integrate skill instruction into content courses must become aware of the requirements of effective instruction of skills. The main difference between skill and content from a pedagogical point of view is that skill is inherently general while content is specific. From this it follows that successful instruction for skills requires 1. repetition 2. active participation 3. DIVERSE CONTENT. It is the third of these points which is most likely to be overlooked by the instructor in a course primarily devoted to a specific content. A good history professor may attempt to get her students to grasp a thinking skill, e.g. the evaluation of causal hypotheses, and choose several examples to illustrate this skill. Unless the teacher is sensitive to the requirement of content diversity she will probably choose three historical examples--after all, that is her field of expertise. In doing so the skill will not be taught in its true generality. At best the students will see that this is a skill that can be applied to other cases in history. They will not even attempt to apply it in engineering, or marketing, or library science, or psychology.

Skill instruction with DIVERSE CONTENT is extremely labor intensive. Not only must the instructor use multiple examples of each skill, which is itself time consuming, she must also select these examples from a variety of disciplines. This means that time and effort must go into selecting examples from outside the instructor's specialty. Something must be done to limit the demands on the instructor in order to keep the task within manageable bounds. I have two practical suggestions: 1) an analysis of the course should reveal that certain thinking skills are more relevant to that particular course than other skills, the instructor should focus on these. 2) The instructor needs to do some diagnostic testing of his students. There is no need to instruct every student in every skill. Only the specific individual weaknesses of students need to be addressed.[5]

DIVERSE CONTENT should also be integrated into skills courses. In these courses the temptation is to rely on CONTENT FREE explanations rather than on UNIFORM CONTENT. CONTENT FREE instruction in skills can take the form of uninterpreted symbols (p v q, -p / q), or in nonsense words (All toves are slithy, Howard is a tove. Therefore, Howard is slithy), or in contextless use of pronouns and demonstratives (If this, then that. This. Therefore, that.) We all resort to CONTENT FREE explanations from time to time, though they are extremely difficult for average students to understand.

In teaching thinking skills to average students in a course where this is the primary focus I have integrated content, in the form of both terminology and information, from diverse fields such as biology, accounting, theology, politics, and history. This has numerous advantages: 1) It avoids the contamination of background knowledge and beliefs. In using questions with content one can never be sure whether or not the student is answering on the basis of logic or if they are making a guess based on their background beliefs. If unfamiliar terminology is used it practically eliminates the possibility of such contaminents. 2) It improves student motivation. It has virtually eliminated the recurrent question: what's all this stuff for? 3) It actually teachs some content. 4) it works with rather than against the normal tendency to interpret sentences semantically. 5) it gradually weans the student from a dependency on semantic interpretation and allows then to become aware of syntax in a natural fashion.

As I have indicated above, the optimal approach for the instruction of thinking skills is one which utilizes DIVERSE CONTENT. This is labor intensive even in content courses, where skill development is incidental. It becomes a very heavy burden in courses which are primarily devoted to skills. In a skills course one must draw on content outside one's area of expertise not once or twice a week, but many times in each class meeting. Any labor saving device is welcome under such circumstances.

I have found it necessary both for research and for teaching purposes to construct sets of questions with DIVERSE CONTENT based of common reasoning patterns. I have constructed three or more questions for each of over 100 identifiable skills. I have put these questions into a database which allows me to construct tests quickly and easily according to specific designations.

Tests of thinking skills need to be constructed very differently depending on whether the purpose is to test the skill level of individual students or if the purpose is to conduct research into the individuation of skills.[6] For both these purposes I have found need of an extremely large database of questions with DIVERSE CONTENT. For research purposes I use all the questions of a particular type. If there are statistically significant correlations among the answers given for these questions having a common logical pattern but DIVERSE CONTENT then I conclude that I have isolated a real thinking skill. Work of this kind is necessary to build up an empirically verifed taxonomy of thinking skills. The taxonomies of thinking skills which lie behind the major tests currently on the market have been validated only by analysis of the questions on those tests. Since these tests are not designed for research into the individuation of thinking skills but rather for evaluating individual students the results are far from decisive. We need tests which are designed specifically for that job. Such tests must contain several questions which purport to test the same skill. Tests of individuals on the other hand need to cover as many skills as possible in order to get a valid sampling of the extent of the students mastery of the universe of skills.

A databank of questions with DIVERSE CONTENT is also necessary for instruction. Having this database at my disposal allows me to engage in extensive diagnostic testing of students. Before attempting to instruct a group of students in a particular set of skills I pre-test them to determine individual strengths and weaknesses. Students self-diagnose based on the pre-test and then focus their study time entirely on those skills which the test indicates that they lack. This eliminates the need to present material to students which they already possess and saves the instructor and the students valuable time and energy. Subsequent tests can be pulled from the databank using entirely different questions which test exactly the same skills. Students know that they will see questions of the same form with different content so that they realize that they must be prepared to apply the skill to wholly new content. Thus, transference of these skills is a built in condition of success. This method has allowed me to successfully demand mastery level learning with required transference of the skill and has enabled me to cover the same amount of material as similar courses at other universities. I have not had to cut back on the amount of material covered despite switching to mastery level learning.

Early results have also indicated that success in essay writing is highly correlated with the degree of success that a student achieves on mastering these thinking skills.[7] Much work remains to be done, particularly in the construction of an empirically validated taxonomy of reasoning skills. These skills need to be individuated and then the relationships among the skills explored.

Notes

[1] A detailed report of this study conducted by Floyd Mattheis, William Spooner, and Charles Coble may be obtained from Prof. Mattheis, Director, Mathematics/Science Education Network Center, East Carolina University, Greenville, NC 27834.

[2] Lawson, Anton E., "A Review of Research on Formal Reasoning and Science Teaching." Journal of Research in Science Teaching, vol. 22, no. 7, 1985, pp. 569-617. Cited by Mattheis, Spooner and Coble, op. cit.

[3] A extensive study of the reasoning skills of entering college freshmen was conducted using the New Jersey Test of Reasoning Skills. This study is available through the Institute for the Advancement of Philosophy for Children, Montclair State College, Upper Montclair, NJ 07043. I replicated this study on a smaller scale using second semester freshmen at East Carolina University in North Carolina and my results were essentially the same.

[4] John McPeck Critical Thinking and Education (New York, St. Martin's Press, 1981) and Robert Marzano Thinking Skills (Aurora, Colorado; Mid-continent Regional Educational Laboratory, 1985)

[5] Richard B. Miller, "Diagnostic Testing and Individualized Instruction of Reasoning Skills" ISII Conference, 1985, available through ERIC.

[6] This issue is discussed in more detail in Richard B. Miller, "Toward an Empirical Definition of the Thinking Skills," Informal Logic forthcoming January 1987.

[7] Craig Lehman, "Correlating Logical Skills with Educational Background and Progress" unpublished study.

A Motivational Approach to Student Learning: The Lanford Technique

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Overview

The author's first effort at motivating students to improve their learning and resultant grades was geared to a large number of grades, fourteen to eighteen grades per quarter, to provide a rapid feedback to students so that they understood quickly the instructor's perception of their work. These efforts began in the early 1970's. A colloquium on the subject of motivational grading was given the faculty of the College of Business and Administration, Wright State University, in February 1973. An instructor from another department thought sufficiently strong about the concept to engage, with the author, in a controlled experiment using the motivational approach. The experiment was a success and the results published in 1974.[1]

Under department pressure to reduce the number of "high grades" to students, the author reverted to two grades per quarter, the mid-term examination and the final examination. As is to be expected the student grades dropped, about eighteen to twenty-five percent of students made the grade of ninety or better on the mid-term examination and about nine to eighteen percent made the grade of ninety or better on the final examination.

These disturbing facts led the author to seek another motivational approach. Early efforts saw the author setting an objective of fifty percent of the class to make the grade of ninety or better on the final examination. The early efforts produced results of seventeen percent achieving the objectives the first quarter tried, then twenty-four percent the next quarter tried, then forty-one percent, then forty-six percent. At this point in time a student suggested that *students* be allowed to participate in setting the percentage objective. Under this new scheme the achievement percentages rose steadily, to sixty-six percent, to seventy-seven percent, eighty-two percent and eight-four percent. The best achievement so far is that of two sections in the Summer of 1984, one section achieving ninety-one percent and the second section achieving ninety-six percent of the class sections making ninety or better on the final examination.

This progress was so satisfying to the author that the decision was made to apply the concept to mid-term examinations also. Training films dealing with motivation were incorporated in the courses in the early meetings of the courses. Although the percent of the classes achieving the grade of ninety or better on mid-term examinations is not as great as on the final examinations, the results are nevertheless excellent. The very low grades of twenty and thirty, out of a possible one hundred, have been eliminated. The author has encountered only *two* of such low scores since utilizing this technique.

Course Plan

The course plan is relatively simple and consists of six efforts:

1. Instill in students the knowledge of motivation, both from within and without.
2. Make students members of cohesive work groups.
3. Apply theory learned.
4. Demonstrate achievement of objectives, require students to "stretch" to achieve objectives.
5. Teach students how to study.
6. Make the learning experience fun.

Implementation

The instructor keeps before him, to review before the first class period and all other class periods, the advice that students' first impressions count inordinately.[2] The tone, the style, the direction, and the atmosphere established on the first day carry through the entire course. It is strongly recommended that the opening lecture or discussion be devoid of parent messages.

There are some excellent training films on motivation available. Batten's film, "Keep Reaching The Power of High Expectations", is highly recommended.[3] Batten holds that motivation comes from within the individual. Another excellent training film expresses the philosophy of ex-coach George Allen.[4] Allen's football players gave Allen credit for being a highly skilled communicator and for being very very good at motivating his players. This author attempts to create an environment where the student is motivated both from within and without. The students are given the opportunity to perform many exercises to help develop students' ability at self-motivation and to develop the ability to motivate others.

In the first class meeting, students are asked to divide themselves into small groups of five or six individuals. The author has experimented with many ways of group formation and with waiting various periods for group formation. No advantage in waiting until later class periods for group formation has been found. After the groups are formed, each group member is asked to tell all other members of the group two or five facts about himself or herself.[5] After a sufficient introductory period, the group members are asked to list the objectives of the group (members) for the course. After listing course objectives each group is asked to select a leader. After selection, the group leader's first task is to report his or her group's objectives to the class as a whole. The constituency of each group and the group leader appear to have a significant effect on the group's effectiveness, including the participation of group members (including attendance), the degree of cohesiveness, the pride in achievement, and the overall productivity of the group. A small number of groups encountered have been characterized by little participation (including poor class attendance), no class preparation, and course drops.

The small groups perform numerous exercises throughout the course, exercises in charting communication patterns, in identifying group norms and standards of performance expected of all group members, of performing performance evaluations on all other members of the group including a self-evaluation, of performing case analyses of text cases and the force field analysis exercise conducted before examinations.

The students apply theory, particularly through the force field analysis, and also through self-motivation, the motivation of others, the identification of measurable objectives, the achievement of some short range objectives such as grade improvement, the application of transactional analysis theory in courses following the principles course, the opportunity to develop performance standards and use the standards, an in applying their knowledge of group communication patterns. Styles of leadership are sometimes assigned to group leaders by the author to acquaint both leaders and group members with various styles. The small groups develop group objectives for the course and the individual students develop their short range and long range objectives. The group objectives may be reviewed during the course to determine achievement or progress.

In group study sessions, the students with grade point averages of three point five or four point have the opportunity to show students having a grade point average of one point eight or two point three how to study. The author finds group study sessions for undergraduate students to be very effective.

The author enjoys (has fun) in the undergraduate classes in which this technique is used. It appears the students enjoy the classes also. This enjoyment is evidenced by the animated (sometimes noisy) discussions in the small groups, by the frequent peals of laughter in group exercises, by the desire (frequently) to have some type of out-of-class meetings for beer or for a party, and by the formation of long-term friendships among the students. Some of the groups formed in the first course appear intact in the second course. Many of the groups remain basically intact throughout the junior and senior years. The author is convinced the students have fun using this technique.

No small group meeting rooms are available to the author. The group meetings are conducted in the large classroom. If chairs can be "circled", they are. If permanent rows of seats are in place, the student adapt themselves by sitting on two rows, the front-most row facing rearward, and other adaptive methods.

First Class Meeting

The first two class meetings are very important. In the first class meeting, after roll call with a show of hands to help the instructor learn to put names with faces, the students are asked to form groups of five students per group. Of course, the groups come out with four to seven members per group but the instructor makes no change. The formation of the groups has been described earlier. This author numbers the various groups. The numbers are assigned by the instructor in the order that the groups complete their organizational process. The group leaders are asked to show hands when their group has completed introductions, determined group objectives, selected the leader, and show hands. First to complete the process is designated number one, and so on. A numbering system from left to right is just as good in fact, will save many steps on the part of the instructor when collecting papers from groups in group order.

When the groups report their objectives, the instructor may comment upon the objectives if so inclined. Some objectives listed will be easily attained, some attained with "stretching", and occasionally, an objective is listed that is outside the scope of the given course.

After reviewing the class objectives for the course, the attention of the class is invited to the training film, "Keep Reaching: The Power of High Expectations" (previously referenced). This film by Batten discusses motivation from *within*, and relates events in a business organization and in the home life of an aspiring but as yet unsuccessful manager. Of course, all works out well, each of the aspiring manager's sons are motivated to achieve each's objective, and the father gets his desired promotion - *after* developing the ability to set the stage for subordinates to motivate themselves. Some very useful instructor notes come with the training film, including a questionnaire to help each participant assess his or her strengths or weaknesses in motivating both self and others. Apparent weaknesses should then become the targets for improvement. Batten's "Circle of Motivation" is a very good learning device. Other suggested exercises include the opportunity for each participant to list his or her strengths and weaknesses and asks the participant for ways to improve perceived weaknesses. An excellent suggested exercise is for each participant to write a relatively short paper on the subject, "This is the person I think I am". This paper by each student, together with the later paper on personal objectives of each student, gives the instructor an excellent insight into the achievements and objectives of each student. The present author bemoans the fact that he does not have a photographic memory and the ability to recall the image of each student as these papers are read! The exercises do develop a feeling of empathy and caring on the part of the instructor. But then, the Batten film, "Keep Reaching....." emphasizes the necessity of caring enough about others to encourage their best performance. Here is an example where an individual (the present author) learns enough about theory to try it!

The course syllabus is distributed at the end of the first class meeting. The syllabus contains "parent" messages which should be avoided in the first meeting.

Grading Scheme

The grading scheme is very simple. Essay-type mid-term and final examinations are given, based on material covered in the text(s), from training films, from cases, from exercises, or from material reported on in class, as well as material covered by the instructor. Students are provided the opportunity to do a research project on a subject relevant to the course for an additional grade. Still another grade opportunity is provided for an oral presentation to the class based on the research paper. The paper and oral presentation are directed at the achievement of a department objective--the improvement of communication skills in our students. The essay type examinations also provide opportunity for development of communication skills.

The instructor's expectations for students is included in the course syllabus. These expectations include:

a) Read assigned material
b) Outline assigned material
c) Study assigned material
d) Answer review questions and case questions
e) Achieve chapter objectives

The expectations are rigorous. Unlisted expectations include this same type of familiarity with training films viewed, cases analyzed, and exercises performed in class.

The Second Class Meeting

The training film, "The Future Is Now," setting forth George Allen's management philosophy, has been previously referenced. This training film has been widely used in management seminars and professional meetings. It is an exciting film to watch and contains a great many worthwhile components of Allen's philosophy. A recommendation is made that each instructor using the film outline each part of Allen's philosophy to review at the end of the film. The use of this film, together with emphasis on personal objectives and planning, and the use of the film, "Keep Reaching," set the stage for students to want to do well. The force field exercise to be discussed demonstrates what can be done to achieve grade objectives.

Students are asked to write a personal objectives paper covering these time periods:

a. This course
b) This quarter
c) This year
d) Upon completion of college degree
e) At end of five years
f) At end of ten years
g) At end of twenty five years

Students are asked to identify what additional education, training, and work experience will be required to achieve objectives in each time frame and, very importantly, how is this additional education, training, and work experience to be achieved?

Many students have not been afforded the opportunity to really think out their objectives and set them down on paper. Of course, this very brief exercise is insufficient for a project of this importance, but it is a beginning. Students should be advised to update their objectives periodically.

In repetition, one very important part of the objectives paper exercise is to cause the student to consider what additional knowledge is needed to achieve objectives and how the additional knowledge will be acquired.

Other Suggested Training Films

Another suggested training film is "What Every Manager Needs to Know About Long Range Planning."[6] The sub-title of part two of this two part film is "Invent Your Own Future." This sub-title fits in very well with the course emphasis on objectives, planning, motivation, and control.

The training film "Imagination at Work" is a very simple film with a very powerful message. It clearly demonstrates some barriers to creativity and contains advice on how to overcome these barriers. This film may be used in conjunction with an exercise to demonstrate that individual creativity can be improved. The suggested exercise begins with the request that students make a list of all rectangular shapes they can see in the classroom. When all have had ample time to complete the list, the number of rectangular shapes seen is totalled and the instructor asks how many students find ten, or twenty-five, or forty such shapes. The highest number reported is written on the blackboard and students asked to turn the list face down. At this point, attention is invited to the training film "Imagination at Work."[7] The film is shown and the highlights reviewed. The students are then asked to participate in another demonstration exercise. A large square divided into sixteen smaller squares may be drawn on the blackboard. Students are then asked to report the number of rectangles seen. Some report sixteen, some seventeen, some thirty-two, some forty-eight. The higher totals are derived by counting two squares as a rectangle, then three squares as a rectangle, horizontally, vertically, and in combination.

Another exercise may be to ask the class at what point on earth every window in a house would have a southern exposure? The answer is the North Pole. Another exercise concerns the person who walked three miles south, turned west and walked three miles, then turned north and walked three miles, returning to the starting point. Along the way, the person saw a bear. What color was the bear? White - since the bear was a polar bear found in the north polar region.

There are numerous other stories to demonstrate the fact that some teachers encourage creativity and other teachers inhibit creativity. Another exercise is the solution to the "Nine-Dot Challenge." This exercise is reported to be a classic test of strategic thinking.[8] This exercise demands analysis, planning, and imagination. The challenge is to connect all nine dots, arranged in a square of three horizontal rows and three vertical rows, using only four straight lines, without lifting the pencil or chalk. It is reported that there are fifteen possible answers to the "Nine-Dot Challenge."

The object of all the exercises discussed is to encourage students to look at things--or situations--in other than the "usual" way.

Upon completion of these exercises, the students are asked to pick up the list of rectangles seen in the classroom and asked if they can add any more. The list usually grows by leaps and bounds as students combine square floor tile into various size rectangles, and the same for ceiling tile, then add light fixtures, blackboards, windows, pages in text books and notebooks, shapes seen in the design of articles of clothing, and so forth.

An Effective Exercise

The following exercise, useful in management courses, was taken from a management textbook, probably Certo's. The small groups of the class may be asked to list all claimant interests on a specific business organization in the community. Some claimant groups are owners, stockholders, employees, supplier, customers, community, and government agencies at various levels of government. The class may be asked to list the objectives of each claimant group. Finally, the class may be asked to determine how top managers of the specific business organization can, or may, or will accommodate the conflicting claims of the various interest groups. Other disciplines may substitute training films and exercises pertinent to that particular discipline.

Key Exercise: Force Field Analysis

This exercise is believed to be the key to the success of this particular motivational technique. Kurt Lewin's Force Field Analysis may be used to determine whether a desired change appears possible at a given point in time.[9] History is full of examples of good ideas that failed due to lack of preparation or lack of assessment of the resistance to the change. Resistance to change is to be expected. An important task is the determination of where the resistance is to be expected and the determination of how this resistance may be overcome through education, demonstration, and perhaps persuasion.

Lewin's exercise calls for the identification of all factors impacting on a desired change--factors that are positive and will enhance the probability of adoption or accomplishment of the desired change, and factors that are negative and will inhibit or reduce the likelihood of the adoption of the desired change. The positive factors are plotted on one side of a "line of equilibrium" (that may be drawn either horizontally or vertically--textbook authors use each method) and shown by arrows which may have different lengths to denote different "strengths" that are subjectively assigned. The negative factors, with corresponding strengths, are plotted on the opposite side of the line of equilibrium. The present author sums the total of the positive factors and of the negative factors, and combines the two totals to give a simple "figure of merit." The figure of merit is useful in pointing out to students the amount of effort necessary (in some cases) to weaken or eliminate negative factors. The positive factors should be strengthened if possible.

Some positive factors students frequently mention are: the desire to do well, the desire to improve grade point average, the desire to learn the subject material of the course and how to apply it, the desire to show parents that the student is doing well, and the desire for self-esteem. Some negative factors mentioned frequently include: demands of jobs held, demands of family, "too much material to cover," sporting events, television programs, boy friends/girl friends, parties, and so forth. Some of these negative factors may be postponed or eliminated depending on depth of commitment to high grades.

At the completion of the force field analysis by each small group, the class may be asked to establish a percent objective of the class who will strive to make the grade of ninety or better on the examination. The percent objective is usually set higher for the final examination than the mid-term examination.

Frequently, the small groups are sufficiently interested to meet outside of class for group study. The number of such groups increase for the final examination preparation.

The present author found it very difficult to achieve a fifty percent objective of students making ninety or better on the final examination when the instructor arbitrarily set a class goal of fifty percent. However, acting on a student suggestion that the class be allowed to set the objective, the percent achievement rose dramatically. The achievement increase was so marked that the force field analysis exercise was adopted for both the mid-term and final examinations.

Results Attained

One student observed:

> "I have seen an example of the management by objectives approach right here in this classroom. You have managed us, and gotten us to manage ourselves, by helping us set our own objectives. Be encouraging us to plan a reasonable percentage of the class to score 90% or better on the tests, you have encouraged us to organize our study method, and do well. It was our decision to make the commitment. After the midterm, we could check to see if our methods of organization were working. If not, we could exercise controls to change our study habits. Very clever! Thanks for a good class."

Efforts to improve student learning as reflected by grades on examinations may progress slowly at first. This author has seen the elimination of very low grades such as twenty or thirty out of one hundred. This improvement alone makes the motivational learning technique worthwhile. The best results achieved to date were those of two undergraduate sections in a summer quarter, one section achieved ninety-one percent of the class making ninety or better on the final examination and the second section achieved ninety-six percent of the class making ninety or better on the final examination.

The author does not achieve this very high figure with every section every quarter. Sections vary in the same quarter and results by quarter vary. It can confidently be predicted that fifty percent of the students in each undergraduate class will achieve the grade of ninety or better on the mid-term examination and that seventy percent will achieve the grade of ninety or better on the final examination.

The fun quotient of the courses has improved significantly. Please review the manifestations of fun discussed in the section on "Implementation."

The author is presently experimenting with the practice of allowing the small groups, at the completion of the force field analysis exercise, the opportunity to suggest questions for possible use on examinations. The results so far are promising. The students cover the important concepts covered in the text(s), the training films, the cases, the exercises, and other material brought into class.

For instructors interested in value development, the Morris Massey film and television tape titled "What You Are Is Where You Were When" is highly recommended.[10] Massey's discussion of why values of different age groups who grew up in different time periods are influenced by events of that time period goes far to explain why values differ. The tape is a valuable adjunct for management classes interested in organizational behavior and for other disciplines interested in values and value development.

The author invites correspondence discussing the use of similar motivational techniques, of suggestions for improving the application of the technique, or of critical comments which may be used to improve the technique.

References

[1] Lanford, H. W., and Dovel, T., "Grading Based on Motivation," ERM, (Engineering Research Management), June 1974, pp. 113-15, p. 28.

[2] Battino, R., "The Importance of Being Impressive: The Opening Lecture," Journal of Chemical Education, Vol. 57, January 1980, pg. 67.

[3] "Keep Reaching: The Power of High Expectations," Batten, Batten, Hudson, and Swab, Inc., Creative Media Division, Des Moines, Iowa, 1977.

[4] "The Future is Now," (George Allen), Concept Productions, Sports Films and Talents, Minneapolis, Minn., 1973.

[5] Battino, R., "The Humantics Psychology Movement and the Teaching of Chemistry," Journal of Chemical Education, Vol. 60, March 1983, p. 226.

[6] "What Every Manager Needs to Know About Long Range Planning," BNA Communications, 9401 Decoverly Hall Road, Rockville, Maryland 20850, 1973.

[7] "Imagination at Work," Roundtable Productions, 113 North San Vincente Boulevard, Beverly Hills, California, 1959.

[8] Wiley Professional Book Announcements, John Wiley and Sons, Inc., Dept. 7-6666, P. O. Box 092, Somerset, New Jersey 08873-9976, Front Cover, Fall, 1986.

[9] Lewin, Kurt, "Field Theory in Social Science," D. Cartwright, ed., (New York:Harper and Brothers), as discussed in Paul Hersey and Kenneth Blanchard, Management of Organizational Behavior, Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632, 4th ed., 1982, (pp. 269-72).

[10] Massey, Morris, "What You Are Is ..." (video recording), Magnetic Video Library, Farmington Hills, Michigan, 1981.

STRATEGIES FOR INDIVIDUALIZING INSTRUCTION ACROSS THE DISCIPLINES FOR THE CULTURALLY DIVERSE LEARNER

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Strategies for Individualizing Instruction Across the Disciplines for the Culturally Diverse Learner

Colleges and Universities in this society are confronted with an opportunity and challenge to educate all individuals regardless of race, creed, sex, socio-economic status or cultural background (Hoover, 1977).

In part this challenge has resulted from failure of educational institutions to fully recognize and accomodate the individual needs and interests of learners from culturally diverse backgrounds.

Who is the culturally diverse learner? Many of these learners are from the lower socio-economic strata. However, all culturally diverse learners are not disadvantaged. There are many groups represented among the culturally diverse; however, the majority of this group is comprised of Blacks and Hispanics (Riessman, 1962).

According to psychologists, sociologists and educators, many diverse learners enter the classroom with positive strengths that enhance the learning process. However, when judged against standards of most schools, the culturally diverse learner suddenly appears to exhibit negative attributes that limit the learning process (Hoover, 1977).

In order to accomodate the educational needs of these learners, educators need to build on the entry-level strengths of culturally diverse learners. Riessman (1962) identified the following strengths of these learners:

1. They are physically oriented. These learners often excell in sports and other activities which require the use of skills from the psychomotor domain.
2. They have a desire to engage in role playing. The

The diverse learner often uses this strength to act out behavior in an attempt to solve problems.

3. They are problem oriented in their approach to learning. In order to fully understand a concept, it is often necessary to provide a concrete representation of an abstract idea.
4. They often learn from an inductive approach. Middle-class learners tend to be more deductive in their approach to learning. However, the culturally diverse learner has not been socialized to learn from wholes to parts. For example, these learners often perform well in computational mathematics, however, they are less successful in solving word problems which require deductive reasoning.
5. They are often persevering in their approach to learning. Many learners from this group have been labeled dull or stupid. These labels have been attached to culturally diverse learners due to their inability to complete intellectual learning tasks at the same pace as the middle-class learners. These learners are often very cautious or meticulous in their learning styles. Of course there is a vast difference between a slow learner and an incompetent learner.
6. The culturally diverse learner is often described as verbally abstract. It is often assumed that this type of learner is inarticulate and non-verbal.

However, these learners bring into the classroom a very complex language. This language must be acknowledged by educators in order to understand and meet individual needs and interests of culturally diverse learners. Culturally diverse learners communicate freely in their own environment. The difficulty is between standard language and informal language communicated within their own culture. Listed below is an example which illustrates verbal ability hidden from the minds of middle-class oriented educators. The example was taken from the writings of the well known Black poet, Langston Hughes (cited in Riessman, 1962).

Motto

"I play it cool
and dig all jive
That's the reason
I stay alive.
My Motto,
As I live and learn, is:
Dig and Be Dug
In Return." (p.6).

In formal English this poem should be translated to mean the following:

I do not bother anyone
I accept each individual
Thats how I survive.
My belief,
Based on my experiences
in life is:
Accept other people
and they will accept
you in return.

7. Culturally diverse learners often express a need for cooperative learning experiences. While there are many

negative sides to the family life of these learners such as divorce, the use of physical punishment as a discipline technique, inadequate food and shelter; there are some strengths which too often are ignored. The culturally diverse often rely on the extended family members such as grandparents, uncles, aunts and cousins for security and as a support system. These learners possess a need for loyalty and cooperation within their social groups. The use of group activities in the classroom is an effective approach to learning which should be employed in the classroom for accomodating social and academic needs.

The list of strengths of the culturally diverse learner is not comprehensive. Only those strengths that were deemed most critical for enhancing effective academic learning were examined.

After examining the strengths of these learners; what teaching strategies should be employed with this group in real life classroom settings to fully accomodate their academic strengths?

It has been found that a number of strategies such as the lecture method, that accomodates the learning styles of middle-class learners often fail to meet the needs of culturally diverse learners (Hoover, 1977).

As described earlier, the life style of the culturally diverse learner often places emphasis on skills and norms which are in total conflict with the middle-class orientation of most schools. Therefore, educators in every discipline must be responsive to these learners by identifying individualized ways to teaching which will build upon the strengths of these students.

While there is no absolute prescription for meeting the needs of these learners; a number of individualized strategies have proven to be successful. Some of the strategies that most closely match the learning styles of these learners include the following (Hoover, 1977, Kierstead, 1986):

1. Visual, kinesthetic and tacticle teaching strategies have been effective when matched with these highly physical oriented learning style individual (Coronett, 1983).
2. Role-playing and socio-dramatic teaching strategies have proven to be effective with the culturally diverse learner. This technique allows these learners to employ slang and other verbal and non-verbal expressions that they feel at ease using. Examples of role-playing which can be used when teaching the culturally diverse learner in any discipline include games that are often employed in mathematics, economics, and social studies.
3. The contract is another individualized approach to teaching that has proven to be an effective strategy for meeting the needs of this cooperative style learner. Such a strategy often involves signed contracts between the teacher and student. It identifies tasks to be completed, due date of assignments, and grades the students expect to earn. This approach has also been found to foster high motivation among the culturally diverse learner. The contract also allows

these learners to work at an individual pace without competing with peers (Hoover, 1977).

4. Computer-assisted instruction is another strategy which permits the teacher to individualize instruction. It provides the hands-on experiences and drill needed by the slow, persevering student. The computer provides the student with immediate feedback. According to Hunter (1984) feedback strongly influences the motivation required to succeed in learning.
5. The tutoring plan is a final strategy that can be employed to enhance learning across disciplines for culturally diverse learners. This strategy allows for one-on-one instruction. In many colleges and universities peer tutors provide instruction for learners in a variety of disciplines.

These strategies provide teachers with alternatives for meeting individual needs of learners. Matching teaching styles with learning styles starts the teacher to recognizing individual differences and to begin creating a classroom climate to foster learning among culturally diverse students.

The study of teaching strategies that fully accomodate the needs of culturally diverse learners must continue to be explored in order to insure that these learners reach their full potential. Cultural experiences of these learners must be acknowledged as educators explore effective ways of teaching learners in all disciplines.

References

Cornett, Claudia E. (1983). What you should know about teaching and learning styles. _Phi Delta Kappan Fastback_, _191_, 44-45.

Hoover, Kenneth. (1977). _The professional teacher's handbook_. New York: Allyn and Bacon, Company.

Hunter, Madeline. (1984). _Mastery teaching_. El Segundo, California: Tip Publications.

Kierstead, Janet. (1986). How teachers manage individual and small group work in the classroom. _Educational Leadership_, _44_ (2), 22-25.

Riessman, Frank. (1962). _The culturally deprived child_. New York: Harper and Row Publishers.